THE CHILD'S MIND AND THE KINDERGARTEN

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Child's mind and the

common branches

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THE CHILD'S MIND
AND THE
COMMON BRANCHES

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THE CHILD'S MIND AND THE COMMON BRANCHES

BY

DANIEL WOLFORD LA RUE, PH.D.

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"PSYCHOLOGY FOR TEACHERS," ETC.

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INTRODUCTION

A First Talk with the Student

Practical and positively helpful is the motto I have placed before myself in writing this book. If it does not give you vital help for every hour of your busy day of teaching, then it fails of its purpose.

I find those people most practical, in the long run, who have thought their way into at least a moderate amount of "theory." For theory such as the worker wants is no flimsy tissue of dreams, but a structure of ideas that prove themselves true by the results they produce. Logical theory is the hub of the wheel of truth, holding in order a whole circle of facts. A grasp of theory may put us in possession of a great number of related facts which we might otherwise have to acquire singly, if at all.

Let us illustrate. If you were going to teach me to run an automobile, you might proceed in any of three ways: (1) You might take me, in all my ignorance, into the seat beside you, and without explaining anything, show me how to turn this button and push that lever until the thing buzzed and started, how to turn the steering wheel, and so on — just one trick after another. In this way I might get on fairly well for some time, and drive without even knowing what made the car go. Perhaps I should congratulate myself on being a good practical driver; but some day, when something went wrong, I should have no idea of what it was or how to fix it, because I should not understand the machine.

(2) You might begin in the opposite way, and without showing me anything about practical driving, concentrate on the understanding process. As a result, I should be able to pass an examination on the *science* of running a car — the "theory" of it — the chemistry of producing and exploding the "mixture," the plan of engine cycles, the adjustment of differentials, and so on; and I should know just what is going on inside the works whenever the driver pushes a button or turns a lever. "The mere driving of the car," you would tell me, "is a simple knack which any one can pick up for himself." But life is busy, and people do not pick up things so easily and incidentally as they are sometimes supposed to, and I should probably lose a job or two (as many teachers have done) before I could apply in a practical way the complex bulk of knowledge you had given me.

(3) You might steer between the two extremes above described. You might first explain to me what makes the car go, what are the fundamental parts that keep it going, just what is happening inside the "works" whenever I push a button or pull a lever, and so on. This would give me insight. If I then practiced my knowledge by actually running the car, I should know just how to control it, how to avoid injuring it, how to get maximum power out of it under varying road conditions, and how to treat it when it balked. I should also realize the limitations of my own knowledge and power, and call in a specialist when he was needed.

This third plan is of the type we shall follow in studying *The Child's Mind and the Common Branches*. Accordingly, we shall work first (throughout Part I) to get insight. We shall find what makes a child's mind go, how to control it

so as to get most power out of it, what is going on in the brain when we pull our educational levers, and so on.

Psychologists who have experimented on the solving of puzzles, find that a subject will do a great deal of experimenting with a puzzle until he gets insight into the principle according to which the puzzle is worked out. After that, he can usually work the puzzle every time and quickly. Further, if he is given another puzzle somewhat like the first, he masters that quickly. But if he has simply juggled with the first one till he has learned some trick of solving it, without knowing just how or why it works as it does, he may have as hard a time with the second as if he had had no experience whatever with puzzles.

Now, just as different puzzles may have much in common, so that if you can solve one with insight you may be able to solve many others that are similar; and just as different makes of automobile have much in common, so that if you can manage one with insight you can soon manage any other; so the elementary school subjects have many difficulties in common. If you know what is going on in the child's mind when you teach him any one of them, you have caught the cue that will make you master of teaching them all.

This cue of necessary knowledge is simple enough for any teacher to master — James said that it "might almost be written on the palm of one's hand." James is a great simplifier of general psychology, as Thorndike is of educational psychology. In the chapters that follow, you will hear many echoes of both these men. Neither must be blamed, however, for anything that happens in this book. I have taken their simple but sweeping laws of learning and applied them (together with many other contributions from

special investigators too numerous to name) to the daily tasks of the teachers of our common schools — to the teaching of the common branches.

I hope the reading of this book will make your work sweeter and lighter.

D. W. L.

State Normal School
East Stroudsburg, Pennsylvania
December, 1923.

PART ONE

EDUCATION AS THE FORMING OF BONDS IN THE BRAIN

PART ONE

CHAPTER I

The Nature of Bonds

Exercises. — 1. In colonial days, when the minister was the school examiner and the Bible was a reading book, a certain minister, while examining a school, called on a boy to read. The boy complied, and in his best form began: "And the Lord spake unto Moses, saying *tick*, Speak unto the children of Israel, saying *tick*, *tick*, and thus shalt thou say unto them, *tick*, *tick*, *tick*, *tick*."

It is recorded that this response "acted like a shower-bath on the poor teacher, whilst the minister and his friends almost died of laughter."

How do you explain the boy's reading in this fashion? The *ticks* were imitations of clock ticks. The old-fashioned teacher, in the days of slow-ticking clocks, had his pupils imitate the time-piece as a means of pausing the proper number of seconds at the various marks of punctuation. This boy was not expected to "tick" during examination, yet did so innocently. Why?

If this incident suggests any rule that you think could be laid down to guide teachers, state it.

2. A certain horse used to go alone to the railroad station when he heard the whistle of the in-coming train, wait till the train had gone, and then return home.

How do you account for this? Why do not all horses do it? How would you get a horse to do it if you wanted him to?

What is a bond? — A certain lazy student attached a string to his door latch, so that he could pull it from where he sat at his study table and let people in without getting up.

Here was a *bond*, a *connection*, between himself and the door latch. The old-fashioned doorbell worked on the same principle; you pulled a handle, and this was attached to a wire which passed on the pull and so rang a bell within.

Notice, in each of these cases, three simple essentials: (1) a disturbance at the beginning, such as the pull at the bell handle; (2) some means, such as string or wire, for passing on the impulse; (3) a resulting response, as the ringing of the bell, which may seem very different from the original agitation. Number two, the "means for passing on the impulse," is a bond between the original disturbance and the resulting response.

A bond is a connection of some sort. In your automobile, there are bonds which reach from the levers and buttons outside to the machinery inside. In the cash register, there are bonds so built that when the clerk presses the correct keys, just the right figures fly up into sight and show you the amount of your purchase.

Bonds are fundamental in this book. So let us study a few clear cases of them, first in lifeless things, then in plants, and after that in animals, including little human animals.

Bonds in lifeless things. — First, there are *mechanical* connections. When you set your watch, there must be some kind of bond operating between your hand on the stem without, and the watch hands turning within. In your typewriter, there must be a connection from each key that you press, with the type as it comes into contact with the paper. Each key of your piano must be connected with a note — that is, must drive a hammer against a certain wire. Go into a printing shop and watch a linotype machine at work; what a wonderful bond, connection

of some kind, there must be between each letter-key and the casting of that letter in type metal!

In addition to mechanical bonds, we find *chemical*, *photic* (light), and *electrical* connections. The fuse of a firecracker or a skyrocket forms a fire bond, a chemical bond, from the stimulating match outside to the explosive response within. There is a photic connection, a light-bond, between the object you photograph and the picture in the camera. Another light connection extends from the moving-picture machine to the screen on which the picture moves. This age of electricity offers endless examples of electrical connections; what are telephone and telegraph but bonds from sender to receiver? Even the humble doorbell now works most commonly, not by mechanical connection, but by bonds that are electrical.

It was once thought that the human nervous system worked like a mechanical doorbell; that is, that the nerves were strings, corresponding to the wires of the doorbell of days gone by, and produced their effects by actually pulling on the muscles and the glands. Our present idea is that something like an electrical impulse passes over the nerves; or in other words, that the nervous system works more like a modern electrical doorbell. At the same time, it is safe to say that nerves act somewhat like firecrackers; for the nervous impulse has something chemical about it. We may even assert that man's nervous system is much like what a piece of fireworks would be if the fuse and inner powder renewed themselves immediately after burning, so that a certain small explosion could be produced many times over.

Bonds in plants. — Everyone has noticed how plants respond to light and water — to whatever is necessary to

their type of life. And they do all this by means of some kind of bond or connection inside them. There are botanists who even believe that they have discovered nervous systems in plants; but, if such nervous systems exist, they are probably very rudimentary and crude compared with ours. Darwin, in order to test out what a plant could and would do, had a trombone played to it; but it did not seem to respond to sound. It evidently had no sound

FIG. 1. Showing the action of a remarkable bond in a plant: the sundew bending over to get its meal of meat. (From *The Book of Knowledge*, p. 3539.[1])

bonds. It was even worse off than the pupil whom you may have in your school, who "can't tell one note from another" because nature has not furnished him with a separate nerve bond for each separate note.

Yet plants do wonderful things. See how the touch-me-not responds by flying all to pieces when you stimulate it by tapping its full pods. The English sundew, if you hang a small piece of meat near its flower, bends toward the

[1] By permission of the Publishers of *The Book of Knowledge*, 2 West 45th Street, New York City.

meat slowly, and at length closes upon it and consumes it. A closely related plant, the Venus' flytrap, snaps shut like a flash when an insect lights on its flower. So wonderful are this stimulus, bond, and response that Linnæus, "Father of modern botany," spoke of them as "Nature's miracle."

Nor is the wonder done, for these responses show *discrimination*. The sundew will not close its tentacles on anything that is not food; and it will not close on objects that strike it with impact, but only in response to steady pressure, be that pressure so slight as the weight of a tiny fragment of hair. The Venus' flytrap, being set for a different kind of action, does not respond to pressure, but to impact, such as the lighting of a fly.

Bonds in lower animals. — The more humble animals appear, like the plants, to have no nervous systems. As we should expect, their behavior is very simple and plant-like. When the water brings a bit of the right kind of vegetable matter into contact with an amœba, it puts its "arms" around the particle, encloses it, and thus makes a dinner of it, much as the sundew does with a fragment of meat. The amœba, too, is able to discriminate; it does not put its arms around everything that comes along, but clasps only that for which it has need.

As we pass upward from the more humble to the more exalted animals, the abundance of bonds and the variety of responses become so great that it takes whole libraries to describe them. The earthworm, one of the lowliest of creatures that enjoy the convenience of a nervous system, has a set of nerve connections for every zone of its squirmy body, and another set, running from head to tail, that keeps all these zones coöperating — pulling together instead of pulling apart, or at cross purposes. It responds to food,

to touches of various kinds, to electric shocks, and so on, to such an extent that it is possible to give it something of an education.

Still, if you had to teach a school of wild animals of any kind, you would soon be surprised at the very limited number of different tricks which they can learn to perform. Animal trainers always find it hard to give a varied program without encroaching on another trainer's tricks.[1] It is true that many animals, left to themselves in their accustomed surroundings, show a sort of nature-wit that seems like human intelligence. Burroughs says that the house wren, if he builds in a box that contains two compartments, will fill up the one he does not use "so as to avoid the risk of troublesome neighbors." But no doubt we often give the creatures credit for being more intelligent than they are. For example, a tiger in a circus always grew restless and excited when a certain tune was played by the orchestra, and it was at first thought that he had a fine "ear for music." But it was discovered that this tune was always the last on the program, at the close of which the animals were fed. The bond he had formed was of a different nature from what had been supposed. It was not a connection between music and soulful feeling, but between music and bodily feeding. That tune was the tiger's mess call.

Learning is forming bonds. — Other things being equal, the difference between a creature that has mastered any given piece of learning and one that has not, is that the first is now in possession of a set of bonds, of connections, which the latter yet lacks. Let a waltz be played, and the practiced waltzer is "off with the music." His waltz bonds

[1] Ellen Velvin — *Behind the Scenes with Wild Animals*, p. 126. Moffat, Yard and Company.

are working, from ear to brain and from brain to feet. Could we project his brain and that of the non-waltzer on a screen in such a way as to show all the differences between them, we should observe that certain paths, or connections, stand out strongly in the one; whereas the other, in corresponding areas, remains a blank.

"Educating" the piano and the typewriter. — Suppose all the keys of your piano or your typewriter were disconnected from their respective hammers or type pieces. Then you would have to give the instrument an "education" by forming the proper bonds in it. You would have to "connect up" each key so that when you struck it, an impulse would pass in through that mass of wires and levers, not at random, but *along the one right route that could bring the desired response.*

If your instrument were so made that every time you struck a key carefully and correctly, it did its bit toward forming the right connection, and every time you struck a key carelessly or unskilfully it did just as much to form a false connection, the educating of that instrument would be very much like educating a child. You would be extremely careful about striking a key or letting anyone else strike one; for you would not want your piano to play *b-flat* when you struck *d*, nor your typewriter to print a *j* when you struck an *a*. We ought to be just as careful as to who "plays on" a child, and for much the same reason.

> "Why, look you now, how unworthy a thing you make of me!" says Hamlet to Guildenstern, when the latter has insisted that he cannot play on a pipe. "You would play upon me; you would seem to know my stops; you would pluck out the heart of my mystery; you would sound me from my lowest note to the top of my compass: and there is much music, excellent voice, in this little organ; yet cannot you make it speak. 'Sblood, do you think I am easier to be play'd on than a pipe?"

This is good warning for every one of us who attempts to play on a human instrument.

If we could have brain tuners, as we have piano tuners and repair men, educating a child would be easy. All that would be necessary would be to lift off the top of his skull, make the proper connections among the fibers of his brain, and close him up again. He would then behave properly, responding in approved fashion to whatever was done to him — and he could probably be made to think some wonderful, original thoughts besides. But no such miraculous brain surgery as this can be expected; and so teachers will have to work on, making brain connections as best they can by operating from the outside.

Educating a plant. — We could, perhaps, find our way inside of plants to the point where connections are made; but there seems to be no very definite mechanism there, such as wires or nerves, to connect. Yet plants can be educated, within limits. The morning-glory is trained to climb a string. Beans can be made to throw out few leaves or many, few pods or many, produce shriveled beans or plump ones.

Of course, the bonds we form in the plant must be within the limits of its nature; we cannot teach an onion to climb a string. But this is true of children also; they can learn only that which is within the limits of their inborn nature. No one can teach a color-blind child to see color correctly. One girl of about twelve years, normal in most matters, was not only unable to sing, but after five months of training could not even clap her hands rhythmically, as for marching.

In the brain, nature must have *started* the bonds or the teacher can never *complete* them.

Educating an earthworm. — No animal is so stupid that it cannot learn at least a little. Yerkes worked very patiently to find whether he could teach an earthworm to turn to the right when it reached the forks of the road. The "road," as arranged for the worm, is shown in Figure 2.

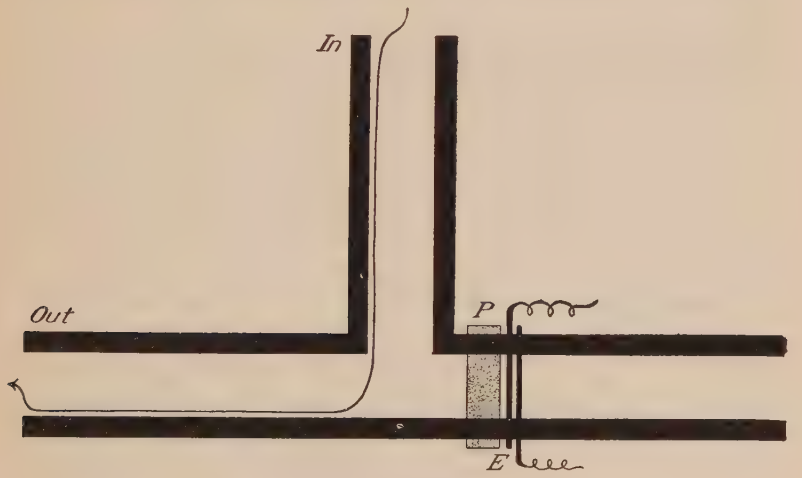

FIG. 2. Apparatus for determining whether an earthworm can learn to choose the correct one of two roads. The light line running from *In* to *Out* shows the path followed by the worm on its thirtieth trial. (From Yerkes' monograph, "The Intelligence of the Earthworm," p. 337.)

The worm was released at the point marked *In*, whereupon it crawled down the highway to the place where the two roads branch off, each at a right angle with the main road. But the worm could not go far toward the left before he found his way made unpleasant by sandpaper (*P*); and if he still persisted in this sinister direction, he soon came into contact with a live electric wire (*E*) which was sure to persuade him to go back. He learned, after a time, to heed

the warning of the sandpaper, and not to blunder ahead and be punished — a notable example, it seems to me, of what we may call *anticipation in learning*. Later, he further proved his kinship to man by ceasing almost wholly to take the left-hand road when he reached the forks, and by turning quite regularly to the right, where lay the way of freedom and success.

Educating an elephant. — When an animal trainer wants to teach an elephant to stand on its hind legs, he has the animal lifted by means of a derrick, at the same time giving the word of command. After this has been done a certain number of times, the word of command is sufficient, without the derrick; the familiar signal "sets off" the animal to do his trick.

Stimulus, bond, and response. — At the beginning of this chapter we found, in the case of the doorbell, "three simple essentials: (1) a disturbance at the beginning, (2) some means for passing on the impulse, and (3) a resulting response which may seem very different from the original agitation." And these three essentials have appeared in all the examples cited.

In discussions about teaching and learning, these three essentials are known as (1) *stimulus*, (2) *bond* or *connection*, and (3) *response*.

A *stimulus* is, in general, anything that starts a bond to working. The stimulus that makes a Venus' flytrap snap shut is sudden impact on its flower, as of a fly alighting. The stimulus that made the earthworm turn to the right was what we call in psychology a "situation," where there is not merely one simple signal for action, but a group of circumstances all exerting their influence — in this case the "forks of the road." The stimulus for

the elephant was at first the situation, "being lifted and receiving a signal"; later, the stimulus was simply the signal word.

The *connection*, or *bond*, is a nervous connection, and requires, typically, (*a*) a nerve fiber running from sense organ to brain, to carry the impulse to the brain, (*b*) a connecting fiber, or fibers, in the brain, to carry the impulse to the proper point of exit (as connections are made on the telephone switchboard), and (*c*) a final fiber to carry the impulse from the brain out to the muscle (or other organ) that is to respond. Just what it is that runs over the nerves, into the brain, through the brain, and out to the muscles, we do not yet know. One old theory, now exploded, stated that it was juice of some kind — a term which electricians still use as a kind of slang name for the electric current. Whatever it is that passes over the nerves is commonly known as a *nerve current*, or better, as a *nerve impulse*. When a trainer gives an elephant the stimulus word, telling him to stand on his hind feet, a nervous impulse runs from the animal's ears in to his brain, through the brain by a certain path — which must be just the right path — and out to his muscles, causing them to move.

The *response* is what happens at the delivery end of the bond. In the case of the earthworm spoken of, the response was *turning to the right;* and in the case of the elephant, *standing up on hind feet.* But the response need not always involve so much muscular activity. The response of a certain married woman, on seeing a former lover (not her husband), was *turning pale.* Your response when you receive a letter from your old home town, may be *sitting in the twilight, dreaming of home.*

The essentials of good learning. — The essentials of any piece of good learning are three:

1. A stimulus well established.
2. A clear connection — clear through.
3. A ready response.

A boy had taught his dog to sit up and beg. Later on, when company was present, the boy's father tried to get the dog to do his trick, but failed. The son happened in at the time and told the dog to sit up, whereupon he did so without hesitation. The dog had not learned to respond to the situation, *Man saying "Sit up,"* but reacted at once to the stimulus, *My Master saying "Sit up."* Children in school may respond well to the teacher when they cannot answer the same questions, or nearly the same ones, put to them by the superintendent. If there is to be a change in the stimulus, as there was in training the elephant to stand on his hind legs, the change should be *practiced.*

But a "clear connection, clear through," is also necessary. A woman once spoke of a "con-se-crete road," meaning a concrete road. A psychologist who was present suggested that the woman who had made the error probably went to church regularly. He was correct. Here the nervous path (connection) for "concrete" got mixed with that for "consecrate"; the first syllable, *con,* which is common to the two words, setting off the wrong second syllable because she had said "con-se-crate" so many more times than she had said "con-crete." There was no clear connection, clear through the woman's brain, for the word *concrete.* The boy who went on "ticking" during examination (see Exercise 1 at opening of chapter) was simply using the well-worn brain path that had many times been thrown into action by his teacher's telling him to read. The teacher had not trained

him to stop ticking during examination, and consequently he had no brain connection corresponding to *Read-without-ticking-while-the-preacher-is-present.*

But sometimes, even if one knows clearly what he wants to do, the response is not ready, or perhaps not possible. One's mouth may be so dry that he cannot utter well what he has to say. Very likely you can think notes higher than you can sing, and can even set your vocal cords to sing them, but the cords refuse to vibrate at such a lofty pitch. A very successful school that teaches rapid typewriting, has the learner spend a great deal of time loosening up his fingers; thus making more flexible the heavy palmar covering of the hand, and gaining control over and strengthening each finger. Expert teachers of piano put their pupils through similar training. The muscles must be capable of a "ready response" at the instant when the nerve impulse is poured into them.

Bonds in children. — Our pianos, typewriters, automobiles, and other mechanical devices come to us with connections all made, ready to work. Nature makes some of her animals on the same plan — the insects especially. As soon as they arrive at the adult stage, they can do all that they will ever do.

Some bonds in children are ready-made by inheritance, and so are ready to work at birth. The normal child breathes at birth as soon as the air stimulates his lungs — though sometimes a little spanking is necessary as additional stimulus. And many other things that he does are done without learning. Some of these inborn bonds are complete "all but the finishing," and as the child grows older, nature finishes them without any trouble on the part of his elders; so that he "naturally" works his fingers

and pulls at his toes, plays with the objects about him, grabs things to eat, shows some fighting spirit, perhaps tries to run away from home a time or two, and so on.

But most of the bonds in the child's nervous system have to be *taught* in. Putting on his cap becomes the signal for going out of doors, and so for joyful demonstrations. A mother commonly teaches her baby to "wave by-by" by taking hold of baby's hand and waving it, at the same time retreating from the room and repeating "By-by." Sometimes, when baby has learned the trick well, it gives him such pleasure that he is even resigned to go to bed for the sake of performing his little by-by act. A bond built by mother or teacher may rival the connections contrived by nature.

It is instructive to watch a principal or teacher — a *good* one — as he trains his pupils at the beginning of the year in certain essential acts, such as the flag salute. How clearly he sets forth the signal to which they are to respond, and how definitely he later repeats it till it is "well established." How carefully he gives and explains, step by step, the response which he expects, repeating it until his pupils are ready to try it with him, and at length to steer through it alone. Not yet does he stop, however; he observes the more common errors, and corrects them before the class; and, as the repetitions go on, his keen eye inspects the performance of each pupil. He gives individual aid, if need be, or assigns some pupils to be tutors of others. He is bound to have, in every brain, a definite connection, clear through. He will not be satisfied until each has achieved a correct and ready response. To the careless onlooker, he appears to be wasting time; but he is really saving it — saving it for every day of the year.

CLASS EXERCISE

The purpose of the exercise is to study the forming of the bonds that are necessary in order to pass to the board and work there in the most efficient way.

1. Let the instructor, or class and instructor together, form a plan whereby the class (or a section of it) can pass from seats to the board without conflict or confusion, and work there in orderly and uniform fashion. The following points are suggested:

a. That each shall pass always by the same route from seat to board.

b. That each shall take his station always at the same place at the board.

c. That each, on reaching the board, shall immediately take chalk and write his name at the top of his work space, and then turn and face the instructor until directions are given.

d. That there be practice in counting off by 4's, 5's, etc., so that four, five, or some other number of topics can be assigned by number, each topic to be treated by every board-worker who has its numeral.

e. That each student erase his work at the close of the class period unless instructed to do otherwise.

2. At the command of the instructor, let the class practice the exercise as agreed upon, until it moves smoothly and easily.

3. Report of observations, with discussion.

In such a performance, is there anything difficult for children to learn? Any point at which there is likely to be disorder? How can books, pencils, etc., be kept from falling to the floor when the owners are rising from seats and passing to the board? Need there be any passing each other in narrow aisles? Suppose no chalk is found at the board: how should the situation be dealt with? What necessity is there for the teacher to plan beforehand how he will give out work? If all at the board are doing the same work, such as a drill problem, how should the teacher find employment for those who finish it more quickly than the others? Under what conditions should each pupil take his seat

as soon as he has finished? If all are to return to their seats at the same time, should there be a special plan for this?

Passing to the board and doing board work are among the most common and most essential of school exercises, but they frequently give rise to disorder. How can you train your pupils in these essentials so as to have a well-established stimulus, a definite connection clear through, and a ready response?

FOR FURTHER STUDY

1. Give five original examples of bonds.

2. A thirteen-year-old boy, when writing such words as *almost, always, etc.*, began them with *all*. What very old bond was asserting itself in these less frequently used words?

3. A cook was heard to remark that she thought Dewey must have been a very brave man to sail up Vanilla Bay as he did. Explain in terms of bonds.

4. Show the similarity between training an elephant to stand on his hind feet and training a baby to wave "by-by."

5. A young lady who intended to write *training*, wrote *traing* instead. If one of your pupils should do this, what should you think as to his ability to spell the word? Why?

6. Show why we should speak very plainly and correctly to a baby if we want him to learn to talk well.

7. An old man, on meeting a certain friend whom he had not seen for some years, rushed up to her and said, "Why, Mrs. C., what a *useful* look you have — and after all these years!" Explain in terms of bonds.

8. Before cabbage plants can be removed from the hothouse and set out in the field in the early season, they must be exposed to more or less cold. What must be done to girls and boys before they can safely be sent out into the "cold world"?

9. Why is it that one who is educated by direct contact with the world sometimes has an education superior to that obtained in school? Explain in terms of connections formed in school, and connections needed in dealing with the world.

10. An actress who did not like a certain actor, refused to receive a kiss from him at rehearsals, saying, "That is only in

the play." Leaving out the kiss at rehearsals may be safe for expert actors, but would not be so for amateurs. Why not?

11. A man who had just bought a horse, found that it insisted on stopping at every mail box along the road. He had bought the horse from a rural mail carrier. Explain in terms of stimulus, bond, and response.

12. List several bonds that have to be formed (*a*) in arithmetic, (*b*) in spelling, (*c*) in geography.

13. "What is the condition of the interior of the earth?" asked a teacher. "It is in a condition of igneous fusion," replied her pupils. Then came the principal and asked them, "What should I find if I dug a hole down to the middle of the earth?" They were unable to answer. Why?

14. It is said that on the morning after the battle of Sedan, "six hundred cavalry-horses, without riders, galloped up at the sound of the bugles, and took their accustomed places in the French ranks." Were they unusually intelligent horses, or how else can you explain what they did?

15. Speaking in terms of bonds, what provision for forming them should you expect to find in an ideal course of study?

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CHAPTER II

The Brain as an Instrument for the Forming of Bonds

Exercises. — 1. A young man who lost his right arm by accident after coming to maturity, has for some years used his left hand for handshaking. He sometimes has dreams that involve handshaking; but in these dreams, he always shakes hands with the right hand, never with the left. Where do you think the bond is, chiefly, that controls a handshake, in hand or brain? Why? Compare, in this case, the bond for right-hand-shaking with that for left-hand-shaking, as to (*a*) strength and (*b*) number of connections with other brain paths. What is your evidence?

2. Write the alphabet forward, noting in seconds the time required. Now write it backward, again noting the time in seconds. Which method runs off more easily and quickly? Since you are dealing with the same letters in each case, letters which you have known for years, why should this be?

If you have taught a child that *Three and four are seven*, or that *Three times four are twelve*, should you then expect him to know, without further teaching, that *Four and three are seven*, or that *Four times three are twelve?* Why or why not?

Bonds must be formed through a network of nerves. — If all the connections in the brain were separate, like the wood and metal connections in a typewriter or a piano, so that each could be built simply and separately, our job of educating a child would be a rather easy one. But a nervous impulse, when it enters the brain, is somewhat like a train running into a railroad yard; that is, there are many tracks lying open ahead, with many switch arrange-

ments to control them (see Figure 3). But the switches in the brain are not tended by an independent roadman who can move mechanical rails according to his will, regardless of what has been done before. These brain switches are alive, growing, changing, and they tend themselves; they open and shut according to (1) the way they are made (born), and (2) their previous openings and shuttings.

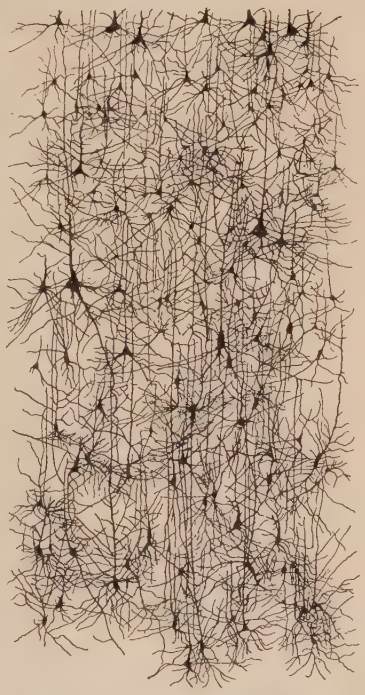

FIG. 3. A section through a part of the brain, suggesting the many possible paths on to which a nerve impulse may be switched. (From E. L. Thorndike's *Elements of Psychology*, p 129.)

Some typical nerve pathways. — If the whole matter begins to seem complex, let us remember that while a whole railroad system is puzzling, a study of the switch arrangements in use at any one point is really very simple. So it is with the nerves; the plan of their fundamental and typical shiftways can be mastered in a short time, and is so practical that you will use it in every lesson you teach. Let us illustrate.

Figure 4 shows five typical nerve pathways. The first is the extreme of simplicity — so simple, in fact, that our smallest act is likely to involve much more than is here shown — but the general picture is truthful. Your fishhook

may serve as stimulus (*S*) for an angleworm; but this will not make his muscles move until a nerve thrill runs in to *C*, a center in his crude little spinal cord, and out again

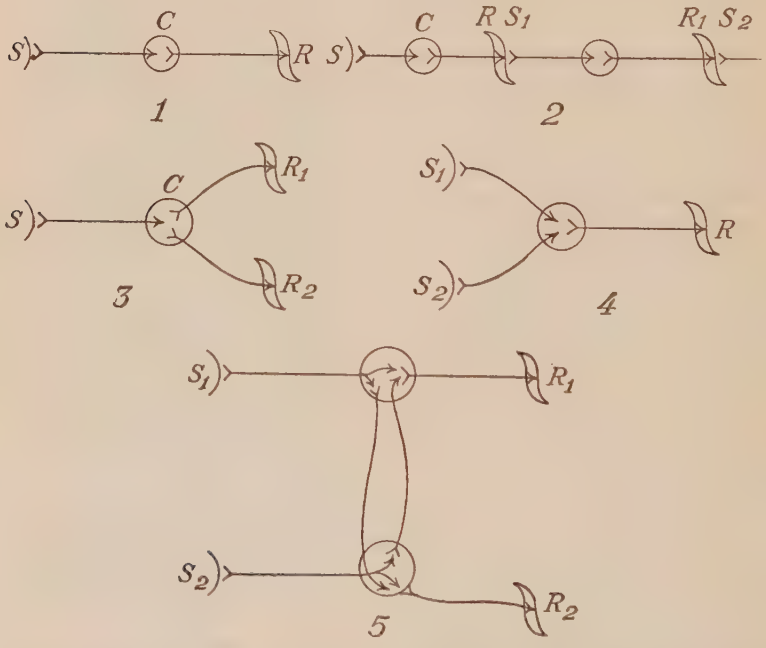

Fig. 4. Some typical nerve paths. *S*, *S1*, *S2*, stimulus; *C*, *C1*, *C2*, nerve center; *R*, *R1*, *R2*, response; *RS1*, etc., response which also acts as further stimulus. For explanation of the diagram see the text. (Adapted from C. Judson Herrick's *Introduction to Neurology*, p. 61.)

to *R*, the response of the now excited muscle. Or again, *S* may be sugar on your tongue, and *R* may be the response of a gland throwing saliva into your mouth. Nature has outfitted us all, from angleworm to philosopher, with an abundance of such bonds that work from birth. But we

build many others that work in the same way. *S* may be a stroke that you make on the blackboard before your pupil, and *R* his response, making the same stroke on his paper. Or *S* may be a letter that comes before your eye as you sit typewriting, and *R* the response of striking that letter on your machine.

Diagram 2 shows a chain of such activities, each setting off the next, as each cartridge of a machine gun loads and fires the one that follows it. Your writing of the alphabet is of this character. The writing of *a* sets off *b*, and so on to the end. If nothing interfered so as to break up this circular performance, you would go on writing the alphabet until exhausted, as a machine gun shoots itself out before it stops.[1] Further, a nerve impulse, like a machine gun, but unlike a train, *never backs up;* but, like time, always moves forward along its one-way thoroughfare. Consequently, when you want to write the alphabet backward (having learned it forward only), you cannot do it by shifting gears or turning a reverse lever, or by any process of running the film through backward; you must build new bonds, form new connections.

In Diagram 3, *S* may be ball coming, and *R1, R2,* the throwing up of the two hands to catch it. But sometimes, instead of one response plus another, it is a question of one

[1] In the jelly fish there is a ring of muscular tissue which is supplied with a corresponding ring of nerve fibers. Under proper conditions, an impulse can be started in these fibers which continues to go round and round the ring for many hours, as shown by the resulting muscular contraction which also chases itself about the same circle. Consider the fondness of children for saying some catchy thing over and over, to the desperation of their elders; our own difficulty in getting rid of a tune that haunts us; and Mark Twain's story of a railroad rhyme that possessed every one to whom it was told:

Punch, brothers, punch with care!
Punch in the presence of the passenjare.

or the other. For instance, *S* may be some one pronouncing for you a word which is spelled, phonetically, *r*, *long ī*, *t*, *rīt*, and your *R* is to be the ordinary spelling of the word, orally or on paper. Whether you spell out *r-i-g-h-t*, or *w-r-i-t-e* (or possibly *w-r-i-g-h-t* or *r-i-t-e*), will depend on how the switches are set in the center, *C*. If you have just been thinking of your correspondence, you will probably spell *w-r-i-t-e;* but if some question of *right* or *wrong* has been agitating you, then *r-i-g-h-t* will very likely roll out of your nervous system.

Diagram 4 shows us, instead of two responses, two stimuli; but they may either compete or coöperate. If just when the lover sends flowers (*S1*) to the young lady, her mother puts in a good word (*S2*) for him, a strong *R* is to be expected. Or, either alone might produce a good response; but if the flowers and the mother are working at cross purposes, the heroine may receive him coldly, or not at all.

Diagram 5 of Figure 4 brings out the typical teaching situation. Herrick tells a story which illustrates it finely.[1] His dog saw some sheep (*S1*) and chased them (*R1*), whereupon he whipped her (*S2*). She ran home and hid (*R2*). On the next day, she again saw a flock of sheep, but this time, instead of chasing them, she ran home at once and hid. The connection *S1-R2*, set up by the whipping, was stronger than Nature's inborn bond, *S1-R1*. What a triumph for education, even if it did involve corporal punishment!

The brain is a reversing station. — One great business of the brain is to reverse nerve impulses, that is, to receive them and guide them back along the right channel. In Figure 5 we get a general view of how this goes on. An impulse coming in at *I*, the back of the spinal cord, sets up

[1] C. Judson Herrick — *An Introduction to Neurology*, p. 67.

an excitation which takes whatever path the set of the switches in the brain has left open to it — short or long, simple or complex.

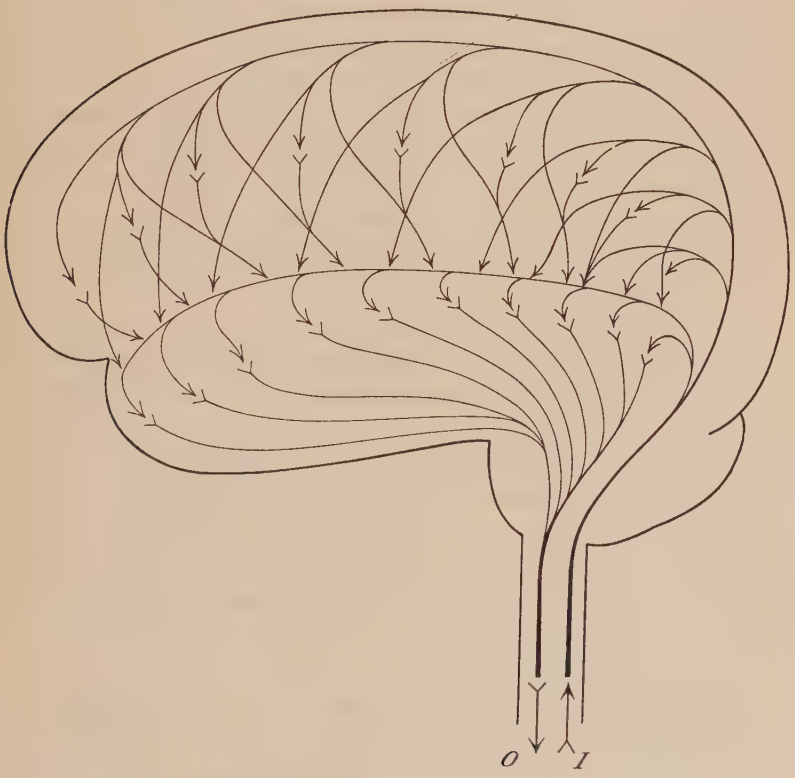

FIG. 5. To show (in a schematic way) how nerve impulses come in (*I*) at the back of the brain stem (the spinal cord and its extension in the brain) and return messages go out (*O*) from its front. The excitation, as it passes through the brain, may take a simple and direct path, or a complex and devious one, according to the set of the switches. For further explanation, see the text.

Probably you have played a game in which a marble is shot up across the board from one side, strikes, then, against

one obstruction after another on its way down, and glances from side to side until it finally falls into a pocket, the number of which tells your score. Suppose Jennie Jenkins (as in the old song) is choosing a color: "Will you have a green, Jennie Jenkins?" But when *green* is tried out as a stimulus, it bumps against an obstruction: "I won't have a green; 'tis the color for the queen," and so this excitation is shunted off onto a connection that results in rejection. In the same way, color after color brings a negative response until *blue* is tried: "Oh, yes, I'll have a *blue;* 'tis a color very true," and so the *blue* impulse proves to be the only one that can qualify to enter the nerve channel that leads to the response of "Yes."

The brain is an organ of discrimination. — The beginning of discrimination consists in responding differently to different things, and is found low down among matters mechanical. Your lock opens to one key but to no other. *Chemical* discrimination is found among the atoms; an acid which rushes at iron and consumes it may remain perfectly passive in the presence of gold or glass. *Light* "discriminates" by penetrating glass but not copper, while *electrical* discrimination is found in the fact that a current will run through copper but not through glass.

Among plants, we have seen that the sundew responds to pressure but not to impact, while Venus' flytrap responds to impact but not to pressure. The amœba, too, we have observed as it "discriminates" between the good-to-eat and the not-good-to-eat. Our lower animal friends discriminate, choose and reject to the point of fastidiousness in case of food, home, mate, and so on. The baby, if the smell of his bottle does not quite suit him, may hurl it to the limit of his arm's strength.

The upshot of the whole matter is this: from toe to top of nature's creation, *right discrimination is the beginning of successful action.* For right discrimination (in a nervous system) is simply guiding the nerve impulse along the right road, that is, the connection that leads to the right response. In one sense, this is all the brain has to do. It is no wonder, then, that nature has been agonizing, through so many thousands of years of evolution, to build in our heads the finest discriminating instrument in existence.

How the brain discriminates. — In a general way, you have the idea already, from the discussion of the brain as a "reversing station," of how the brain discriminates. But the brain does not reverse nerve impulses at random; it returns them along preferred paths. Go into a printing shop and watch the linotype machine as it assorts its matrices. (A matrix is a mold, in appearance like a little brass check, for casting a piece of type.) Here they come, a long succession of them, all the letters of the alphabet mixed together; yet each will fall out of line at the proper point and return to its kind, a's to a's, b's to b's, z's to z's. Each has a special shape, like the key to a lock, and so can pass all tripping points till it comes to one that is especially designed to trip *it*, when off it goes, followed by all others like it as fast as they come to the same point. Everything depends on (1) the shape of the "little brass check" and (2) the resistance it meets, that is, the path that is open to it.

You sit at the soda-water fountain and the clerk starts impulses (corresponding to the little brass checks) in your nervous system: Here they come: "Lemon?" "Raspberry?" "Chocolate?" "Pineapple?" Everything depends on (1) the kind of stimulus (or resulting nerve excitation) and (2) the

resistance it meets. All save one soon meet obstructions which trip them off into a channel that brings a negative response; but one "appeals to you," takes such a form that it meets no resistance. That one you choose.

And here issues a profound truth: simple as this discriminating process seems, *it is all that is necessary to explain the most elaborate acts you will ever teach your pupils to perform, or the deepest thinking they will ever do.* All your teaching will consist in setting up obstructions to one stimulus, removing resistances to another, building a new bond for *this*, breaking a bad old one — if you can — for *that*.

There is a bond for everything, and everything has its bond. — A teacher of a first grade was once very much surprised to find that although one of her pupils knew pennies, nickels, dimes, and quarters when he saw them, and could tell how many nickels were equal in value to a dime, yet she could not by any effort teach him that two and two make four. She told this to the superintendent, who could not believe it until he had tried out the boy himself; then he was convinced. Bonds for nickels and dimes, and the connection for *two plus two*, may lie in separate and distinct parts of the brain. The statement that "there is a bond for everything," means, of course, everything that is in that brain, not everything in the universe; for here was a boy who evidently could not form a bond for one certain process of knowledge, the adding of two and two.

It is simply amazing to an inexperienced teacher to find what closely related items of knowledge pupils can carry in their heads without ever suspecting that one has anything to do with the other. They are like the boy who, blind from birth, had learned to know the house cat by touch. Later, when he had received his sight, he saw the cat but

failed to recognize her; the touch bond and the sight bond were working separately. He then picked her up, looked at her intently while stroking her, and said, "Now, Puss, I shall know you next time."

We can readily see why any new thing attracts our attention, if it is of such a nature as to stimulate us at all; for it starts a nerve excitation which, instead of flowing smoothly along some well-worn brain channel, has no path at all prepared for it. It produces somewhat the same effect in the nervous system that would be produced in the linotype machine if one of the "little brass checks" were so different from all the rest that it refused to follow any open channel, but clogged the machinery until a new passage could be made for it.

Lessons from brain disease. — The behavior of certain of the afflicted shows us how independently bonds may function or fail to perform. For instance, a patient may not be able either to speak or to write the word "bell" if he merely sees the bell, and yet both speak and write the word if the bell is also rung. Or the sound may enable him to speak the word but not to write it, or vice versa. Another finds all nouns, or all verbs, or perhaps all long words of whatever kind cut out of his vocabulary, the remainder of it remaining intact. Or one may be able to speak words when they occur to him, but may be unable either to hear or see these same words when spoken or written by another.

Either the in-going, sensory channels may be clogged, or the out-going, motor pathways, or a part only of either. A cobbler's right hand may lose its cunning, so that he can no longer cobble shoes, and it still may serve him well in other acts. Or one's hand, though not paralyzed, may lose the power to control that little instrument, the pen. Some-

times one whole side of the body becomes "apractic," that is, still under the general control of the will and yet unable to perform its former acts of skill.

How nerve impulses influence each other. — In discussing Figure 4 (diagrams 4 and 5), we found two (and there may be more) nerve channels opening into a final common path. Further, we found that the impulses poured into this final common path from different directions may either favor each other or be antagonistic. If a boy wants a piece of pie and his mother tells him to take it, the impulses resulting from these two stimuli facilitate each other when they enter the final common path. Such an effect is called *facilitation*.

But the impulses may interfere with each other. If two opposing crowds of people, say the reds and the blues, try to come out of the same door at the same time, what happens will depend on their relative strength. If they are of about equal pressing power, they may come out in mingled order, first a red and then a blue; but if one preponderates, it will inhibit (literally, "hold in") the other. Competing nerve impulses behave similarly: an excited small boy on the platform made the startling declaration that

> Under a spreading blacksmith tree,
> The village chestnut stands.

A trained lion attacked his trainer during a performance, downed him, and carried him over to a woman performer who was also in the ring. She quickly fired two blank cartridges and threw her arms round the lion's neck — signals for him to change his act. He at once drew his teeth from the trainer's body, fell into the proper pose, and quite forgot his anger. Why? Because by these old signals she roused a rush of nerve energy which swept with such force

into the "final common path" that it inhibited the angry biting and set off the accustomed act. The well-established stimulus, the definite connection, clear through, and the ready response, saved the trainer's life.

Such a "holding in" of one nerve current by another is called *inhibition*.

If your pupils respect you, and also have a little wholesome fear of you, you may be able to inhibit, by a look or a word, most of their mischief.

Sensori-motor bonds and high-level bonds. — *Sensori* means *coming from a sense organ*. *Motor* means *going to a motor organ*. A sensori-motor bond, then, is one that forms a direct connection between stimulus and response. Suppose you see a flower and pluck it, without thought of who owns it or what will be done about it; you are exercising a sensori-motor bond from eye to hand — a bond that runs through the lower part of your brain.

Look again at Figure 5. Notice that, according to the plan there pictured, an incoming impulse may take either the low road or the high road. If one takes the high road and another takes the low, the latter will get to the end of its circuit first, for it follows a simple, direct route over an open path. These bonds that make use of the "low road" are, in general, sensori-motor bonds. Observe also that the upper part of the brain is richer in roads than the lower part, so that an impulse which attempts to make its way through this network is likely to be switched from point to point in a way that is complex and devious. If you stop to *reflect* before plucking the flower, the nervous excitation is being *reflected* from point to point in your upper brain as you think, "Who owns this?" "Will he care?" "Has he a watchdog?" Etc.

The lower animals (putting it roughly) have only sensori-motor nerve paths. Consequently, if they react to a stimulus at all, we expect their response to be direct, simple, and immediate. We are much surprised if an animal response is delayed (as when a mine mule is said to have waited a month for a chance to kick a man who had flogged him), or if it is complex in the carrying out, or requires any planning, has anything "deep" about it. So far as they go, these sharp-sensed creatures may beat us. Shaler says that "the average horse will be able to return on a road which it has traversed a few hours before, with less risk of blundering than an ordinary driver."[1] But the lower animals, like some very ordinary people, have specialized, as we might say, in sensori-motor bonds, both by birth and training, and at the expense of something higher. For though they are sharp sensed, they are not sharp witted. It is said that a group of monkeys, gathered on a cool night round a camp fire left by an African traveler, sadly watched it die, none of them having intelligence enough to lay on sticks and keep it going.

Relation between sensori-motor and high-level connections. — So long as a nerve impulse can sweep smoothly along a sensori-motor pathway, it will do so; but when something blocks its course, it will rise, like water dammed, to a high-level channel — if there is any high-level in that brain. Here is the reason for the multitude of "don'ts" and punishments which education compels us to inflict on children: we *must* block their sensori-motor, animal-like responses in some way, to compel their nerve currents to rise to the higher, reflective level, to make them "think what they are about."

[1] Nathaniel Southgate Shaler — *Domesticated Animals*, p. 75. Charles Scribner's Sons.

Let us borrow an illustration from James. In Figure 6, *A* shows the brain processes in the animal state, before education. A child sees a toy and responds with a sensori-motor snatch at it. You slap his hand and he cries. You

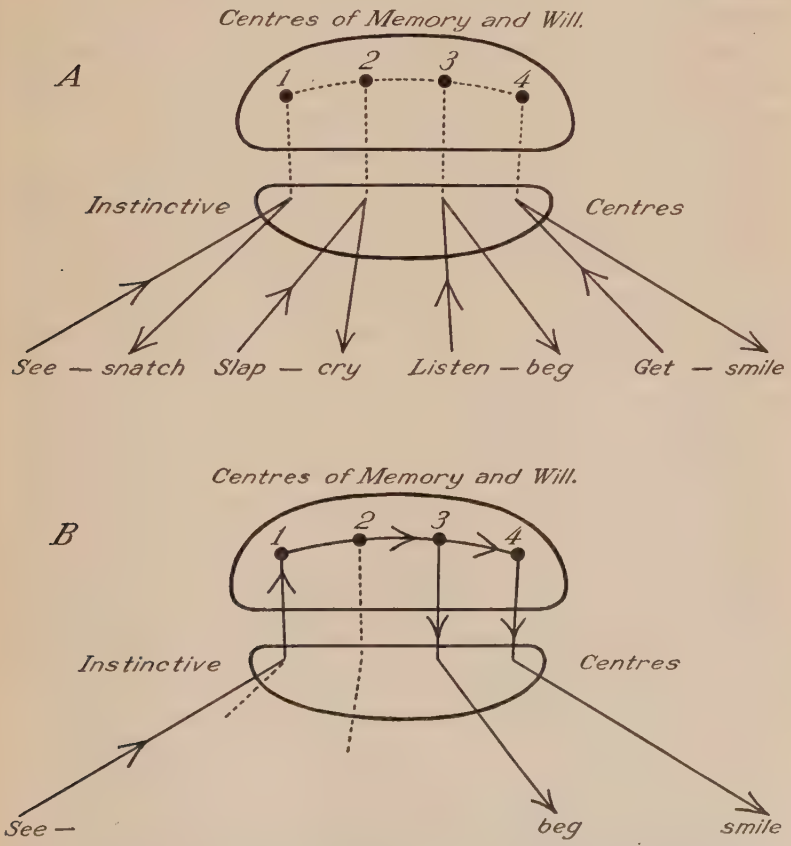

Fig. 6. Showing how we pass from sensori-motor to high-level brain paths in educating a child. (From *Talks to Teachers*, by William James. Henry Holt and Company.)

hold up the toy and get him to listen while you show him how to ask nicely for it, and he "begs." He then gets the toy, and smiles. The arrows indicate incoming and outgoing nerve currents. The dotted lines indicate channels that are being opened to the higher centers.

The second part (*B*) of the figure shows the brain process after education. "The impression *see* awakens the chain of memories, and the only reactions that take place are the *beg* and *smile*. The thought of the *slap*, connected with the activity of Center 2, inhibits the *snatch*, and makes it abortive, so it is represented only by a dotted line of discharge not reaching the terminus. The same fact is true of the *cry* reaction. These are, as it were, short-circuited by the current sweeping through the higher centers from *see* to *smile*." This "educated" response may seem slow and hesitant, especially at first, as compared with the original sensori-motor responses; but it represents a real saving in time, energy, and suffering.

To be educated, then, is to look before you leap, to think twice before you speak, to "use your head" — especially the upper part of it.

Brains must be developed from the bottom up. — This is a point which we teachers are in danger of forgetting, and yet which it is almost fatal to forget. Although the supreme and final effort in education is to call the higher centers into control, *the only road to them lies through the sensori-motor pathways*. "I want you to think this over," you say to your friend; yes, but all you have done is to send a message in through his ears, and so along a sensori-motor channel. It will never reach his reflective centers unless he is given to reflection. Nature made many animals without an upper story to their brains before she

invented man, and she still makes him on a plan that compels us to build up the lower *animal* story first if the upper, distinctly human part is ever to amount to anything. Fortunately, the old style of book-bound education, aimed almost wholly at the high-level cells, is giving way to a new style which leads a child to develop his sensori-motor centers first by using his eyes, ears, and muscles more as the lower animals do.

To try to build up high-level ideas without first exercising the sensori-motor connections is like trying to build a castle in a quicksand. Or (to change the figure) it is like trying to get directly to the upper story of a building, when there is no way of entering but through the lower story.

We must follow the order of nature. — Some bonds are born ready to work, some achieve readiness and then work well, and some, unfortunately, have work thrust upon them when they are not ready for it.

Most interesting and surprising, perhaps, are the connections already formed at birth. Kittens, having never had experience with a dog, and before they get their eyes open, will spit and arch their backs at the mere smell of a hand that has just stroked a dog. White rats, on seeing or hearing or smelling a cat for the first time, show great fear. But they do not act so when first they smell the odor of a rabbit. "Rat-brained" though they are, nature has formed very finely in their little skulls the fibers of discrimination.

Other bonds, although not ready-made at birth, ripen "naturally" at the proper age, as glands and muscles do, and need no training, or very little, to enable them to do their perfect work. For example, the young bird's flying muscles and his flying nerve fibers seem to mature together.

Shaler says that when a young shepherd dog of good blood first sees a flock of sheep, he regards them with such attention as he gives to no other living thing except his master. He feels himself their caretaker, never seizes one unless it tries to run away, and even then does not make for its throat, as other dogs do, but catches it by the leg or the fleece, using only so much force as is necessary. And if excitement does lead him to violate the practice of the good shepherd, "a little remonstrance, or at most a slight castigation, is pretty sure to turn him from his evil ways." [1]

Most of our school teaching would be as easy and pleasant as the training of such a shepherd dog if we could have the same favorable conditions; that is, (1) if we could teach our pupils what "comes natural" to them, and (2) if we could teach it at the time when their brain fibers are most ready to learn it. After all, nature is the great teacher; we must depend on her to furnish the brain fibers, *and we must wait for her to mature them* before we can do any teaching of value. It would be hard teaching a shepherd dog to herd cats, or even to herd sheep, before he leaves off his puppy ways and shows himself ready to become a good shepherd.

One of the very worst features about much of our present-day "education" is that we are ever urging our learning on unready brain cells, destroying happiness, creating nervousness, and making a terrible waste into the bargain.

What is Nature's order? — Nature works like an electrician who strings many wires at once, but turns the current into them only as they are needed, leaving some unelectrified for years. All the nerve cells, some three thousand millions

[1] Nathaniel Southgate Shaler — *Domesticated Animals*, p. 20.

of them, are in place at birth; but they never all develop — you will die with some of yours unused.

In general, the process of growth and of connection-forming begins low down in the nervous system and rises toward the top — the spinal cord first, then the sensori-motor fibers of the brain, and last its lofty and complex portion. How far the process has proceeded is shown, not so much by the growth of the body or its parts, but by what the individual does. The baby coos and cries (upper spinal cord), the school boy hammers and tinkers and plays ball and reads books of wonder and thunder (largely sensori-motor bonds), the man of science experiments and then sits and thinks by the hour (reflective centers).

But there is a further fact so important that if teachers had always known and acted on it, they would have saved a world of trouble; and that is that *there are coarse bonds and fine bonds;* that the coarse bonds produce crude and clumsy responses which must be tolerated for a time; and that only gradually can these coarse connections be split up into fine ones that will give minute, deft, accurate, refined reactions. When any part of the brain is developing, nature throws up a kind of framework of it to begin with, a sketch-plan in which whole ropes and cables and clumps of cells work together at first. Later, and as a final stage, the fibers learn to work singly, each setting off a simple, unit response. The baby's hand is controlled by a coarse bond, and so it works, all fingers together, as one punching or grasping organ; but a few years later, when growth and use have split this coarse bond into many fine ones, each controlling a fraction of a finger, that little hand will be able to button buttons, or guide a crotchet hook, or finger a violin.

A child will attempt, in his crude way, almost anything that he finds his elders doing; but it is *refinement, analysis, minuteness,* and *extreme accuracy* that weary him to death and fatigue him to the very solar plexus — either refinement of muscular movement or too much hair-splitting with ideas. In general, he ought not to begin with minute parts (such as the letters of the alphabet) and build up larger units, like words; but he should begin by forming a coarse bond for a large bulk (such as a word, phrase, or short sentence) and then tear that bulk to bits, forming a finer bond for each of its parts. The channels through his brain are wide and deep; he wants nothing to do with fine discriminations. Probably even you, if you wrote "The cheese had degenerated," would think your instructor in English was making too much fuss over a small matter if he wanted you to say that the cheese had *deteriorated.*

Because of this coarse-framework, sketch-plan development of the brain, youth should try itself out on everything that rouses its interest, doing many kinds of work, even if it does none of them very well for a time.

The brain is a living map. — To begin with, the brain maps the body. The parts of the body, and the brain centers that control these parts, are always arranged in the same general order. For example, if we find the hip center at one point and the foot center at another somewhat removed, we may be sure of finding the knee center between the two, and so on. But not all body parts of the same size have equal centers. The most important, most serviceable, and most carefully controlled bodily organs have proportionally the largest and most complex brain representation.

Further, the brain maps the environment. Not that there

is anything in one's head which looks just like what we see about us; but there is a point, or area, or nerve tract, or "center," to represent everything in the world so far as we have experienced it — and there may be many centers waiting for new experience to come. Now, these centers have to be inborn, and many, if not all of them, are made by nature to respond to just one part of the environment, and to no other part. For example, a part of the brain is set apart by nature to form color bonds, another center to form sound connections, and so on. We all have faith in the "big-brained man" because (among other reasons) we feel that in the mighty architecture of nerve fibers domed by his towering skull, everything will be fairly represented; that on the action-map of his brain nothing will be omitted. He carries the world in his head.

Yet the big-brained man may lack some very valuable centers. Dean Stanley could not tell when the national anthem was being played, except by watching to see whether all the people stood up. No teacher, probably, could ever have formed an action-map for music in the Dean's brain; nature had not furnished the fibers. On the other hand, there was Turner, son of a poor London barber who wanted his boy also to be a barber; but the boy had such strong form-and-color centers in his brain map that he would do nothing but draw and paint. He became one of the greatest painters of sunlight. But in Turner's head, the doings of polite society never were mapped; he was shy and unsociable, and for a time lived in an obscure house and went under an assumed name, so as not to be found out.

What tremendous individual differences we should see in the brains of our pupils if they could lie revealed like so many photographs before us! Perhaps the greatest task

the teacher has is to find with what centers a child's inheritance has furnished him, to what parts of the world he can respond, and then to *plan his education to fit his brain.* Wesley Mills tells of an eminent horse trainer who holds that every horse is specialized by nature for some particular line of work, and so should be broken in by an expert who can discover what that horse's natural specialty is and train accordingly.[1] If it is true of horses, how much more of children that the natural specialty should lead in education.

Laws for the forming of bonds. — To bring out these laws, let us see how a professional trainer educates a jaguar, a leopard, or a panther to jump over a stick.[2]

He lays a broomstick on the floor and then steps back, apparently unarmed. The animal leaps on the stick first, then at the trainer, who receives him with an iron prong, hitherto concealed. The creature slinks away. The trainer next coaxes the beast, stroking him with the very stick which he at first had charged, and at length induces him to walk over it as it lies on the floor. Gradually, and at successive lessons, the stick is raised until the animal jumps it at the desired height. After each practice period he receives his reward: he is fed and perhaps petted. From this process results "a well-established stimulus, a clear connection, clear through, and a ready response."

Notice that the trainer (1) taps nerve cells that are ready to work, the jumping "centers"; (2) inhibits the native reaction of charging, tactfully guides the nervous discharge into the desired channel, then fixes the bond by exercise; and (3) takes pains to make the effect of the performance

[1] Wesley Mills — *Nature and Development of Animal Intelligence,* p. 35.
[2] Frank C. Bostock—*Training of Wild Animals,* pp. 150–152.

agreeable to the animal. From this, three laws of learning stand out. They are:

1. The Law of Readiness.
2. The Law of Exercise.
3. The Law of Effect.

These laws mean so much to teachers that a chapter will be given to each.

CLASS EXERCISES

I[2]

Suppose you had eight cards like those shown below.

T	E	A	C	H	I	N	G

Show how to arrange them in a pack in such an order that if you put the topmost one on the table, then put the second at the bottom of the pack, the third on the table, the next at the bottom of the pack, and so on till all are on the table, they will spell the word *Teaching*. Each card, as it goes down on the table, must be placed at the immediate right of the one that preceded it.

[1] These are the chief laws of learning as stated by Thorndike. The reader versed in psychology may be interested to compare them with the laws laid down by James for habit forming, as below.

James's Laws of Habit.	*Thorndike's Laws of Learning.*
1. Start strongly.	1. Readiness.
2. Permit no exceptions at first.	2. Exercise.
3. Seize every opportunity for practice.	3. Effect.

Thorndike's third law seems to have no counterpart in James's group; but whether the result is pleasant or not will have much to do, actually, with whether one seizes every opportunity for practice. This third law of Thorndike's has been called in question from a theoretical standpoint; but for us teachers, who must take a practical view of things, its value is undoubtedly immense.

[2] This exercise is adapted from Henry Ernest Dudeney's *The Canterbury Puzzles*, pp. 32 and 169 (Thomas Nelson and Sons). A form of solution is there given which will hold for every variety of such problem.

Try it "in your head" first, or with paper and pencil, but without actual cards. If you do not solve it soon, put each letter on a slip of paper and try to arrange the slips properly.

(The instructor may vary the problem, using a shorter or longer word or phrase. If many slips of paper are needed, provide them in advance.)

In solving such a problem, do you prefer to use sensori-motor bonds (as in handling the lettered slips), or to let your high-level brain cells think it out abstractly? Why? How are your pupils likely to feel if you ask them to solve abstract problems without concrete help?

II

Let each go through a textbook in some one of the common branches (chiefly outside of class, perhaps) and list the outstanding discriminations that a learner must make. Following are a few examples: — In Language, *to, too, two; your* and *yours; like* and *love*. In Arithmetic, *counting* (for counting is only applying number-names to successive acts of discrimination); the *times* sign and the *plus* sign; *dividend* and *divisor* (as in the rule for inverting the divisor). In Music, *notes, intervals* (as *thirds, fifths,* etc.), *sharps, flats.*

Have class reports and discussions, with generalizations where possible. Try to interpret the learning in terms of *brain processes* started by *stimuli that differ:* hence the discrimination, the different channel through the nervous system, the different response.

III

Go through the Binet-Simon Intelligence Tests (which can be obtained from the Houghton Mifflin Company, of Boston) and discover how many of the tests, either obviously or by implication, require *discrimination.* For example, if a child, when directed, points to eyes, nose, right ear, left ear, etc., what discrimination is involved?

FOR FURTHER STUDY

1. A certain student sometimes writes *their* for *there*, *signed* for *assigned*, *studing* for *studying*, etc. Another cannot tell the difference between *what* and *wat*, nor between *morning* and *mourning*, when the words are spoken. Another insists that *Laura* rhymes with *sorrow*. What may be the matter in these cases?

2. A dog barked at one man but at no others. A parrot swore at a sailor but at no one else. A crow was friendly with one person but apparently suspicious of all others. Show how these cases could be explained in terms of bonds.

3. If the soles of the feet are tickled gently, lively kicks are likely to result. Yet we put our whole weight on our soles — apparently a much greater stimulus — and feel no impulse to kick. Why is this?

4. If one memorizes a series of nonsense syllables (as *raf*, *mul*, *zed*, etc.), and then arranges them in a new order and again memorizes them, the second learning takes about as long as the first. Think this out in terms of nerve paths (perhaps as shown in Figure 4) and explain.

5. If you were to put each letter of the alphabet on a separate card, shuffle the cards, and then learn the twenty-six letters in the order that resulted from the shuffling, as *r*, *c*, *a*, *q*, etc., should you regard this as much of a task? Why or why not? Compare with the labor of the first learning of the alphabet.

6. Goldie, a tigress, was meek and mild except when a certain red stool, on which she sat during performance periods, was in sight. This made her furious. The trainer painted it another color, but the result was the same. What was the stimulus to which she was responding?

7. People have been known to fall downstairs because, a basement door and another similar one leading elsewhere being close together, they opened the wrong door. Watson, when he wanted to give his rats a hard problem, placed the opening of the true way into the food box, and that of a false way, close together.

Children often become confused in reading words similar in appearance, such as *what* and *when*, but rarely when they meet those that are strikingly different in length or other general appearance.

Starting from these cases, try to discover as many factors as you can that make discrimination easy or difficult. Do you think that doors located near one another in the environment are likely to be "mapped" close together in the brain? Why or why not? What fineness of brain fiber is needed?

8. When a child wants something which he cannot have, why does the mother attract his attention to something else as a means of quieting him? Why do politicians do the same thing with "the people"? Answer in terms of nerve currents and inhibition.

9. Yerkes found that frogs, which did not respond at all to bells ordinarily, would nevertheless jump farther if a bell was rung just when a touch stimulus was applied, than they would with the touch stimulus but without the bell. What principle is illustrated here?

James says that teachers in presenting a subject, should appeal to the eye, to the ear, and to other senses if possible, to make it effective. Why?

10. Give original illustrations of all the types of nerve action illustrated in Figure 4. That is, give concrete situations, such as those found in the text, which, you think, would cause the nerve currents to pass along the paths indicated.

11. Animal trainers find that what one lion can learn in a week may take another a month, and that what one tiger can do after two lessons another can only imitate feebly after months of practice.

Tell of some individual differences you have observed in the kind of thing that people or the lower animals can respond to, or the success with which they can respond.

12. Give two or three original examples of facilitation or inhibition.

13. The energy released by the brain in responding to a stimulus may be much greater than the stimulus carries with it. For

example, which excites you more, to hear in the street the cry of "Fire," or that of "Potatoes"? How do you explain this? Try to think of other examples.

14. Do you think a trainer could teach a leopard to catch fish with pole and line? To poise himself on a big ball? What relation must the learned act have to the animal's acts in its native state? Do you think a bear, if he never stood on his hind feet of his own accord, could be taught to skate on two feet?

15. Give cases of training pet animals, or other teaching, if you can, to illustrate the laws of Readiness, Exercise, and Effect.

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CHAPTER III

Readiness

> And yet so well our *Work* adjusted Lay,
> We came to *Work*, as if we came to *Play*.[1]

Exercise. — Recall your school days, especially those of your elementary school experience, and try to recollect cases in which you were especially eager for your work, or especially averse to it. Describe at least one experience of each kind.

Make a list of the major influences, such as *good textbook*, *regard for teacher*, *desire to excel*, etc., which, in general, led you to work; and a second list of factors which made you unready or kept you from working, such as *subject too hard*, *fatigue*, *poor methods of teaching*, etc. Were you equally ready for all branches at all times?

Compare your readiness for tasks in school with your attitude toward occupations outside of school. If you find anything to be explained, explain it.

What is readiness? — Burroughs tells of a tame gray squirrel that had never seen chestnuts; yet when he was offered some, the squirrel danced with excitement; he put his paws eagerly around them, and drew them to him, and chattered, and looked threateningly at those about him. Long ago, children were taught their letters by showing them little cakes shaped like *A*, *B*, *C*, etc., and allowing them to eat their way through the alphabet as far as they could remember the names of the letters. A girl who

[1] From Cotton Mather's poem on Ezekiel Cheever, the great New England schoolmaster.

wanted to hurry her lace-making, promised herself a chocolate for every scallop she crocheted. Another girl, who hated one of her teachers, studied every lesson thoroughly, in order to deny the teacher the satisfaction of "catching" her unprepared. A boy, eager to have a wireless set, earned money, read books, and worked through a total of several days in order to put through his project. A high school student was so challenged by an algebra problem that he shut himself up in his room for two days and finally worked it out.

As in an electric system, some wires are "alive," charged, ready to act, while others are inert and unready; so in a nervous system, some cells are a-tingle with energy and ready to respond to the slightest stimulus, while others are so unready as to remain sluggish and unresponsive under the strongest of stimuli. Between these extremes there are all grades of readiness and unreadiness. And the very same cells may pass from one extreme to the other under varying conditions of growth, nourishment, work, fatigue, and rest, and the pulses of energy that come thrilling into them from other centers.

Many words with one meaning. — It is unfortunate that, in the discussion of matters mental, educational writers have, in many instances, developed several different terms that all refer to the same substantial fact. You have such a case on your hands at present, and you need to know this in order to avoid confusion and useless labor. The substantial fact is that of readiness or unreadiness, as stated above; and some of the many terms that are used to suggest it are *motivation*, *interest*, and *attention*. The "motivationists," in particular, seem to feel that, since they are conjuring with a different word, it must mean a strikingly

different set of facts; but it does not. Teachers are natural-born gossips; they love to start something new, hear the latest, add to it a bit, startle somebody (either in their schoolroom or out) by telling it again with gusto. But whether the gossip be about "problems and projects," or "mediate and immediate interest," or "incentives," or the many supposedly valuable brands of "attention," still stand the ancient and fundamental facts in the child's brain; master *them* and you will understand the new terms as fast as the phrase-makers can coin them — just as, if you have studied the human body, you can discern its lineaments (though sometimes deformed) in spite of all the changing vesture of fashion.

What does readiness mean in the brain? — In the first place, there must be a "center," furnished by nature at birth and ripened by growth and maturing until it is able to act, somewhat as the sex centers begin to function at a given age. Secondly, this center (in many cases if not all) must have been made by nature to "map" some part of the environment — to master some kind of subject matter, as a teacher might prefer to put it. If Burroughs' squirrel had been given marbles instead of chestnuts, he would not have cut such lively capers; but give the marbles to a boy in the springtime and he will behave much as the squirrel did. Finally, this center must not be interfered with by any inhibiting influences, but must be set for action by impulses that enter it either directly from some stimulated sense organ, or indirectly from some other part of the brain.

Such a center may act as a kind of storage battery, releasing and sending out much more energy than the stimulus sends in.

How to secure readiness. — The general plan is simple enough. Consider first a case of national readiness, sometimes called "preparedness." When our nation goes to war, the War Department becomes the "center" which must be charged with energy. It is likely to have a good deal of energy of its own to begin with; but besides, from every part of the country we pour into it all the stimulating resources at our command; and further, we throttle everything, from man to mouse, that threatens to interfere with its activities in any way. In short, the rule for readiness would read, *Stimulate all facilitators and quiet all inhibitors.*

Now, put a boy's brain in place of the country, and suppose his fighting center, his little war department, has been stirred up by some insult. It probably has a good bit of energy of its own to begin with; in addition, other parts of his brain pour into it many strong and stimulating currents; and whatever would hinder it, such as nervous impulses representing thoughts of dirt and damage, is damped off. So whether you want to put a boy or a nation into a condition of readiness, the rule remains the same, *Stimulate all facilitators and quiet all inhibitors.*

But there are two or three very pertinent observations to be made at this point. The first is that no nation or person can do more than one thing at a time whole-heartedly. In spite of the fact that bonds work with a great deal of individuality and independence, still we must think of the brain as somewhat like a complexly connected system of water pipes, in which great pressure or drainage at any one point creates a disturbance at all other points. The reason why the last period of the day so often brings poor work is not that our pupils are fatigued, but because the thoughts of approaching after-school freedom and sport are rousing

disturbing currents in their nervous systems. Further, when rival currents are started, all depends on which gets possession of "the final common path" that controls action. If some rare bird comes fluttering at the schoolroom window during the arithmetic lesson, very likely you had better halt your number work and begin observations on that bird.[1]

Know your child is another of these "pertinent observations." Know him by living with him, as the animal trainer knows his animals. "I can't tell you much about Shropshire sheep," said an English shepherd when questioned about them; "I've spent most of my life with Southdowns." He could "motivate" and manage the Southdowns.

Why is this? Not all states in a nation, and not all centers in a child's brain, will contribute equally to any cause. Each brain responds differently according to the connections in it, and to get the strongest results we must know which connections will contribute most. The only way to get such knowledge in its fulness is to know our pupils as the good shepherd knows his sheep.

Sample cases of readiness. — A woman who had lost all sensation in one arm, but could still move it, wanted to hold her baby on that arm. She found that the only way to do this was to keep looking at the baby. If she looked away from the child for even a moment, he fell in spite of all she could do. In her poor, diseased brain, the only bond left that could reach those arm muscles was the connection that ran from her eyes in through the sight centers.

[1] Of course the ideal is to use any disturbing occurrence in such a way as to *reënforce* the impulses that bear your lesson along. For instance, a very tactful teacher had prepared to give a fine lesson in first grade reading, when her pupils came trooping in with hands full of maple keys and heads full of excitement about them. She quickly shifted her plan and made these curious little airplanes, with their funny nose-spins, the basis of a blackboard lesson in reading.

A woman tells me that her son "never could explain anything," had no words for his ideas, until a certain teacher (one of the good shepherd type) got him to explain before his classmates some of his electrical contrivances. From that time on, she avers, "he could explain anything." There may be some motherly exaggeration here, but the fact probably was that the center which "mapped" these electrical contrivances was the only one with power enough to break a path through to the speech connections which were getting ready to work.

The mother of a thoughtful boy saw to it that he brushed his teeth every morning of his life until he was ten years old; yet he was always ready to forget about it until he heard the story of microbes and saw why teeth need to be washed. Then he himself fixed the habit of teeth-washing, for good and all.[1] We must use all the supporting centers we can appeal to; but individual acquaintance is necessary to tell which will give the greatest support.

Sometimes it is necessary to rouse inhibiting opposition to the action of some excited nerve tract. In fact, there are frequently two opposing forces at work in the brain, as there are among the people at election time. Dr. Crile finds that he can often help an intelligent patient to control fear or anger by making him see that he may do actual physical damage to his brain and other organs if he permits such emotions to master him.[2] In such a case, the bonds that stand for self-preservation ("nature's first law") prove stronger than the connections aroused by the objects of the fear or the anger.

[1] Frances Gulick Jewett — *Control of Body and Mind*, p. 222.
[2] George W. Crile, M.D. — *Origin and Nature of the Emotions*, p. 74.

Proceed from the ready to the near ready. — Every live, healthy, well-nourished, well-rested brain is ready for something all the time — in spots, at least. That is, some of its connections are ready to act and will probably insist on acting. But what the brain of your pupil wants to do at any hour may not be at all what you as a teacher want to have done. He probably wants to play — children always want to play — but you want him to read. The smooth solution probably lies in having him play the story he is going to read — dramatize it. His play centers, which seem always ready, begin to discharge through his reading connections, which are "near ready," and your lesson is borne along on the deepest currents of six-year-old human nature.

Are there any ever-ready bonds? — Ever-ready bonds are born in the brains of all children (or nearly all), and it is almost as important for teachers to know about them as it is to know where the button is that turns on the current; for such knowledge enables us constantly to carry out the rule, *Proceed from the ready to the near ready.*

We have already discovered these connections, made ready by nature at birth or matured into action later, and without the help of a teacher. (See, in Chapter I, *Bonds in children,* and in Chapter II, *We must follow the order of nature.*) Some of these bonds, and in fact the only ones that we as teachers are much interested in, represent old racial traits called *instincts.* The words "old" and "racial" indicate that such centers "map" situations that have been very vital in the life of man — food-getting and fighting and fleeing and leading and following and mating, and so on. Such responses, for instance, as those that make for self-preservation, must be ready to work at any instant;

and because they must work so strongly, they are marked by strong feeling. It is such explosions of feeling that the teacher must use to drive the car of education.

What instincts of childhood can the teacher use? — We can do little more here than to name a few of these instincts, leaving you to make elsewhere a longer study of this most interesting subject. (For further reading, see references at close of chapter.)

To begin with, there is the *instinct for action* — teachers might feel like calling it the "wriggling and twisting instinct." Children naturally (and that usually means instinctively) want to do something with their bodies — walk, run, fling themselves — move. And we must not forget that in this connection the vocal cords are a very important part of the body; to whisper, to babble, to laugh, to talk, to sing, and especially to make rhythmical noises and movements — these instincts are almost irrepressible.

The instinct of *curiosity*, the exploring instinct or what might perhaps be called, in young children, the instinct for using the sense-organs, is another mighty force. Hands, eyes, and ears, like muscles and vocal cords, tingle with readiness. Of course there must be concrete materials at hand, objects, pictures, colors, and so on, for these ready organs to work on.

The instinct for *playing* and that for *imitating* practically explain their nature by their names. If they were treated according to their importance, they would have to be given many pages instead of merely being named. One expert teacher has summed up childhood by saying that "A child is a playful, imitative little animal." This is not a bad statement to keep in mind.

Self-assertion involves not only self-preservation but also a desire for superiority, power, control. Pride is the frequent mark of it, and it is also the instinct that Satan makes most use of to undo us; but it is far from being all bad. It is the mainspring of the *fighting instinct*, and of *rivalry*, *emulation*, and the desire for what is commonly called "success."

The negative side of self-assertion is *fear*, "shrinking from injury," whether bodily or otherwise. Nor is this all evil. As "the fear of the Lord is the beginning of wisdom," so the fear of the teacher may be the beginning of education. But it should be a wholesome fear, which does not wound the child's nature nor undermine his normal self-assurance.

One of the strongest of all instincts is the *herd* instinct, the *social* instinct, the tendency to go with the group and to do as it does. The feeling that "Everybody's doing it," whether *it* is wearing a new kind of hat, or "saucing" the teacher, or studying hard, is one of the mightiest forces that move us all.

Abilities may have the force of instincts. — What is an ability? All brains, in their instinctive portions, map certain fundamental features of the environment, to which we must all respond. But in addition, each brain has its own special centers, especially strong, in which are mapped with great ease, music, or colors, or words, or what not. Such a trait, insuring ready control over some kind of subject matter, is called an ability. It differs from instinct in being a personal, individual trait instead of being common to all, and in requiring teaching and practice to call it out and develop it.

But ability is inborn, and often more strongly inborn than some of the instincts in the same brain. The baby whose

biography Millicent Shinn has written so beautifully,[1] took great pleasure, when only six or eight weeks old, in listening to chords on the piano, and "even after she was already fretting with hunger, would forget all about it for ten minutes, if one would take her to the piano." Ellen Velvin [2] tells of a showman who so loved his violin that he seriously declared "life wouldn't be worth living without it," and whose dying wish was that his beloved instrument be buried with him.

Here, then, is another set of connections which, as they ripen, will respond with great vigor and vim, and will also help us to "proceed from the ready to the near ready"; for one who wants to carry out a pet project will often plod through a great many intermediary and uninteresting difficulties in order to reach the end that is ultimate. For instance, the boy who wants to make his own violin can be brought to study hard on woods and wood working, which he might otherwise care nothing about.

And here is another reason why you must "know your child" intimately. No book can tell you in advance which child will have which abilities (though the study of heredity makes some revelations), nor at what age they will ripen; for the same ability appears at different ages in different children, and sometimes rather suddenly.

Proceed from old bonds to new ones. — Old bonds are the brain paths that have been well formed, usually by a great deal of exercise. They are based originally, of course, on instincts and abilities. Such are the connections that represent our habits, feats of skill, acts of learning well drilled in. Over these old paths, especially if they have been exercised

[1] Millicent W. Shinn — *Biography of a Baby*, p. 91.
[2] Ellen Velvin — *Behind the Scenes with Wild Animals*, p. 158.

with pleasure, nervous impulses slip with ease, enabling us to build branch lines from them. For habit bonds may be as strong as instinctive connections, and, in fact, differ from them in no essential way except in origin. It is only another case, then, of proceeding from the ready to the near ready.

The good teacher never goes through a lesson without building on these old bonds in some way. Having taught his pupil to count, he presents addition as a short way of counting; multiplication as a short way of adding; algebra, at length, as a kind of arithmetic. Reading begins with words, or groups of words, instead of letters because the pupil has talked words for years, but has never talked letters. Geography is presented in terms of the child's home surroundings, and history is most welcome when told in the language of his own experience.

Summary of sources of readiness. — We have found in the brain three sources of readiness, three kinds of center which the teacher can stimulate when she wants to rouse a child's interest, get his attention, "motivate" him. These bonds represent:

1. Instincts, presumably common to all and ever ready.
2. Abilities, presumably peculiar to each. Watch for their ripening.
3. Habits — using the term broadly to include all bonds well practiced.

Summary of the problem of readiness. — It is commonly stated that the problem of interest, attention, readiness, "motivation," is the most difficult in all education. But under ideal conditions for teaching, it is scarcely a problem at all. For, as said above, every normal child is ready for something all the time. *We should find out what that some-*

thing is and teach it to him. Theodore Roosevelt, as a boy, never had to be urged to study nature. His tutor simply taught him what he wanted to know. The big trouble is, God made the children and man made the schools. The result is that we usually have to teach what we are told to, and teach it at the time when it appears in the curriculum. A new type of school organization is needed.

Further, there may easily be too much artificial urging of interest. For even if we do succeed, by cunning, in creating an inflammatory desire for what we have to offer, we may be thwarting and dwarfing our pupil's deeper yearnings and native abilities in a way that is mentally unhygienic and socially unwholesome.

There is, withal, a legitimate art of mental making ready. Let us see how to practice it.

The animal trainer's method. — The skilful trainer depends on the following factors:

Environment. The homing pigeon is given a pleasant dovecote, in a quiet place, and is fed the food that most pleases him. Chickens hatched and kept on a carpet will not scratch; but sprinkle gravel on the carpet and the scratching begins. If an animal has learned to do a trick in one part of the room, moving his box to another part may cause a breakdown in the habit.

Bodily and mental condition. The animal is kept in fine trim, and is given short lessons so as not to cause fatigue.

Personality of the trainer. It is astonishing to find what emphasis experts lay on this factor, and not only on the courage of the trainer but on other moral qualities as well. Further, the best trainers have a real affection for their animals, and live with them until they know them intimately.

A suitable task. "Suitable task" here means one that the animal to be taught, naturally undertakes. The monkey climbs and swings, the parrot talks, the panther poises and springs; but these animals cannot exchange tricks indiscriminately.

A suitable special stimulus. The first essential is to get the animal to *move* in some way in response to the desire for food, the call of its mother or mate, or at sight of the nest. But if he cares so little about the stimulus as not to move in its presence, the case is hopeless. Further, if he can respond to food *directly*, he acquires a habit very quickly; but if he has to respond to such stimuli as lights (which he may care little about), choosing by means of color the path to his food, hundreds of trials may be necessary before he can do the deed with certainty. If reënforcing stimuli are used, such as food and a mate, or mates, more facilitators are roused and the learning is further hastened.

A happy result. Contrary to common belief, fear and punishment are not much used by professional trainers. They more than carry out the maxim of the Talmud, "Punish with one hand and caress with two." The great secret is that a fine performance is followed by feeding.[1]

Causes of unreadiness. — If we have found above the factors that make for readiness, then we have also found the sources of unreadiness. If an animal (child included) is

[1] Quite lately I was studying some performing seals whose intelligence seemed absolutely startling. The intelligence is undoubtedly there, but I found that the secret was that the trainer gave each a piece of fish every time he did a trick successfully.

It is just the same with all performing animals. The maxim is: "Do your duty and you will get something," and every performing animal knows it, from the elephant, who gets peanuts and sugar, down to the tiny guinea pig, who gets some dainty bit of green stuff. — Ellen Velvin — *Behind the Scenes with Wild Animals*, p. 167.

indifferent to the education we urge upon him, then the cause must lie in an unfit environment, or the unfit condition of the learner, or some defect in the personality of the trainer, or an unsuitable task, or an inappropriate special stimulus, or an unhappy result.

Let us next consider, very briefly, how all these facilitators and inhibitors operate to make the brains of children ready or unready for learning.

Environment. — Both kinds of environment, the material and the social, should favor our aim. The good nurse or mother has rattle and rings and other playthings lying about before the baby needs them, to suggest their use. School apparatus and museum equipment and the town library have the same kind of value.

But stronger still are the social "atmosphere," "spirit," *morale*, of home and town, of the "bunch" or group, and of the classroom or the whole school. The herd instinct is almost all-powerful. And besides, suggestion counts, whether the child is aware of it or not. The knee-kick response of a sleeper is strengthened by stimuli of which he is unaware, such as taps with a pencil or the calling of his name. And if the subject is awake, his knee-kick is increased by hearing a poem recited, or by the crying of a child in the next room. It is remarkable to see how a boy will beg to take up Cæsar if his chum is studying it. The root reason why you and I are civilized instead of savage is because of the environment into which we were born.

Bodily and mental condition. — The good trainer makes it a rule that no animal which is at all sick shall be allowed to perform or be trained. Children are of more value than many lions, and fatigue and lack of sleep may be as much of a handicap in learning as illness is.

One of the worst forms of fatigue, especially for children, is the *fatigue of restraint*, of "want-to-but-can't." Some sparrows, on a rainy day, were prevented from their usual flying, but spent the day scolding and chattering. The experimenter found clear signs of fatigue in their brain cells, "as though, while confined by rain, the little birds had kept up a deal of thinking."

Children must build up inhibitors, must learn to endure reasonable restraint; but just when we are launching our lesson, the fewer cross currents in their brain cells the better.

The personal factor. — Teachers do not seem sufficiently to realize the fact that teaching is a confidence game. Without faith, no miracles. The boy who does not trust his teacher may be as wild and intractable as a horse that distrusts his driver. The teacher should aim to inspire confidence to such a degree that he could sell his pupil a gold brick; but he should also be so consecrated that he cannot abuse that confidence.[1]

Confidence, *sympathy*, *suggestion*, *leadership* — if these words could be printed in type large enough to show their importance, each would have a page to itself.

The pupil tends *instinctively* to follow the teacher in bodily attitude, gaze, attention, feeling. When Professor Higley (a royal teacher of mathematics) fixed his keen eye on a certain section of the blackboard, our eyes all followed

[1] This principle explains, too, the physical influence of the physician or surgeon, who, by his *personality*, inspires, like a Kocher, absolute confidence in his patient. The brain controls many processes that have wholly escaped from the notice of the "practical man." It is in accordance with the law of association that a flower, a word, a touch, a cool breeze, or even the thought of a fishing rod or of a gun, is helpful. On the contrary, all suggestions of despair or misfortune — a corrugated brow, the gloomy silence of despair, or a doubtful word — are equally depressing. — Crile — *Origin and Nature of the Emotions*, p. 47.

his, because his look was so strong and earnest. Woodrow [1] tells of a father who, having interested his little daughter in a picture book, would suddenly turn to the pages of capital letters, point to one, and exclaim with a great show of excitement, "Oh, Martha! Look! Look! There's P!" Then, without giving her time to "discover the deceit and to determine for herself that after all there is nothing wildly exciting about the letter *P*," he would return to the pictures. This was often repeated, with the result that she soon knew all the letters at sight.

An enthusiastic (but not gushing or frantic) teacher makes a ready pupil.

A suitable task. — Papers written by my students indicate that the two factors which make most for readiness are the teacher and the task. But the task gives the golden motive, especially for the more mature children.

As already indicated, a "suitable" task is one for which the learner has native ability, and which is presented at a time when the brain cells which form the seat of that ability are ripe enough to work. Edward Hodges Bailey, who designed the statue of Nelson at Trafalgar Square, could not learn his lessons at school, but was always drawing funny pictures of his classmates. Probably his teacher thought him stupid; but as George Eliot says,[2] "for getting a fine flourishing growth of stupidity there is nothing like pouring out on a mind a good amount of subjects in which it feels no interest."

A suitable special stimulus. — As we get older, we learn to respond to the call of the future — save money, perhaps, to use ten years hence. But children have not lived through

[1] Herbert W. Woodrow — *Brightness and Dullness in Children*, p. 287.

[2] *The Mill on the Floss*, Ch. II.

a very long past, and so do not feel very far ahead. They do not care to cast their bread upon the waters and depend on finding it after many days; there must be some present stimulus, something, here and now, to set them going right.

As we glance over our "summary of sources of readiness," we can see at once what such a special stimulus is bound to be. We must appeal to an instinct, or to a special ability, or to old habit bonds already built on one of these two.

As we glance over our list of instincts, *action* suggests anything with movement in it — the dance, writing or drawing on the blackboard, talking, singing, building, adding or subtracting children to or from a group. The *exploring* instinct bids us have plenty of concrete materials on which to use the senses and muscles, going sometimes on excursions to get them. *Curiosity* is whetted when we make a mystery of things by covering them up for a time, or by holding back the climax of a story, or by presenting a challenging project or problem. *Play* may include almost anything that ingenuity can devise — and whatever the teacher speaks of as a "game" is likely to be regarded as one. *Imitation* is a challenge to do anything — write, draw, read, sing, skip — which the leader can do well and the follower is ripe for. Pupils are as fond of a "demonstration" as we teachers are. And let us not forget that the pupils often imitate a classmate more readily than they do the teacher. *Rivalry* and *competition* can be introduced in countless ways — pitting a pupil against his own old record, or against that of another; or one row, or sex, or room against another, etc. *Fear* may be aroused with impunity if it is moderate fear of condemnation by one's family or mates. The *social* or *herd* instinct furnishes one of the strongest of stimuli for doing anything in creation which

that particular herd can be brought to approve. Be it remembered by all, from politicians to teachers, that there is an instinct for coöperation as well as for competition.

The appeal to ability of any kind, when the ability is there, needs little comment and little of our pedagogical doctoring. He who can dance or draw, sing or spell, read or reckon, and do it well, is not likely to need much urging. *Here is the ideal readiness* — when the worker is lost in his work, the player in his play.

Old bonds, themselves built on instincts and abilities by the child's experience, can only be appealed to when we know what his experiences have been. The promise of a familiar and well-loved trip or a game or picnic or party, may pull the pupil through hours or days or weeks of work.

Vision of a happy result. — If an animal were made unhappy every time it performed well, it would soon cease to perform. In general, unhappiness is nature's danger signal, whereas happiness means "Dare on in the same direction." The child has a brain that looks ahead, sees a vision of how things are coming out. Make that vision a moving one, and do not disappoint it. (This subject will be treated more extensively in Chapter V.)

Primacy of purpose in education. — The lower animals seem to have no idea of time, or of purpose. Even their apparently purposeful acts are mostly "blind," and the same thing is true of many of the acts of children. But the child should gradually get his mental eyes open and act more and more according to purpose.

Now, purpose is *idea of end*, an idea so loved and cherished that it serves as *center of organization* for our activities, determining what shall be done and what left undone. This means that in the brain, one center or group of centers —

perhaps the music centers, or the art centers, or the natural science centers — are leading in their activity, and stimulating other parts of the brain to support them in their leadership. The good teacher, as his pupil matures, is not satisfied with the sort of readiness that just pulls that pupil through the task of the day, but suggests to him ever larger and longer purposes, according to his dominant instincts and abilities. And so comes readiness for life out of school.

CLASS EXERCISES

1. Review this chapter and make an outline of *Means of Securing Readiness*, to be used as a guide to observation when visiting schools.

2. Let each student take a period or more for school visitation, some going to lower and some to higher grades. The greater the variety of schools visited, the better. Try to discover causes of readiness and unreadiness.

3. Place under the name of each instinct and ability a list of the activities which it seems to inspire. For example, under *Social Instinct* might appear *talking, discussing, social play, singing or reading to others*, etc.

Make special note of those activities — such as parties — which call into play a number of instincts and abilities, and try to determine which instincts and abilities they are.

Keep your notes for future use.

FOR FURTHER STUDY

1. Students like to study "in the same old place," and take their examinations in the classroom where they have recited. Show why.

2. A soldier who had lost the power of speech because of "shell shock," became so excited when he appeared before the Queen of England that he spoke, and thereafter retained his speech. Explain in terms of nerve currents, inhibitors, and facilitators.

3. "I permitted myself but two emotions," said Foch, speaking of his work as Marshal during the World War, "and these were 'If I fail,' and 'If I succeed'." Show the value of a feeling of responsibility as a facilitator.

4. If a pupil thinks he will not meet a certain set of facts again, in review or examination or otherwise, what attitude is he likely to take toward them? Why?

5. A boy made up his mind not to hear the alarm clock which his brother had set for an early hour in the morning. He succeeded. What probably happened in his nervous system?

6. Certain secretions of ductless glands are necessary to make muscles work well, but are not needed to increase the efficiency of brain cells. Race horses and human athletes need a warming-up period. Would it be desirable for a lecturer or a teacher to "warm up" by lecturing or teaching for a half hour before facing the final audience or class?

7. A friend of mine requires his children to be at the breakfast table by 7:30 if they are to be permitted to go to the ball games. Just what is the nervous source of their readiness for breakfast?

8. Some schools specialize in writing in the second grade, others in the sixth and seventh. How can we find out when the writing ability ripens in most children? What should be done about it?

9. Give a description of unreadiness in children as produced by a neglect of every factor of readiness, environment, personal condition, etc.

10. Picture a correction of all that is assumed in Exercise 9 to be wrong. What would be the effect on the children?

11. A dog which refused dry bread, was often fed morsels dipped in the gravy remaining in the plate. Yet if he saw bread rubbed round a dry plate, he ate it eagerly until his hunger was satisfied. Explain in terms of readiness.

12. Recall the readiness or unreadiness you have felt when certain lecturers, ministers, or teachers began their talk or exercise. What does this show regarding the personal factor?

13. An eleven-months-old baby walked clumsily if supported and urged; it found the movement unnatural and wanted constantly to drop down to the creeping position. Should such a baby be taught to walk? Why or why not?

14. Different parts of the brain develop unequally at various times, and no two brains just alike. What does this probably mean with regard to abilities and their development?

15. Donaldson (in *Growth of the Brain*, p. 357) says that those methods of education which take advantage of the natural inequalities of growth in different parts of the brain, "preferring irregularity to the roundness gained by pruning, will most closely follow that which takes place within the body, and thus prove most effective."

Do the schools do this if they arrange for just so much growth in each branch in each grade? What change is needed? What advantage is there in teaching pupils individually or in small groups?

16. Give several instances of school exercises in which play might well be used.

17. Describe five lessons that you would teach by having your pupils imitate you.

18. A boy who had been saved from the streets always carried a photograph of the minister who saved him. "Whenever I am tempted," he said, "I take it out. His look is a wonderful help, and by the grace of God I am able to overcome all." Explain in terms of inhibitors.

19. You want to bring about in yourself a condition of readiness for your task of teaching. Review the factors of environment, personal condition, etc., and show what you should be able to get from each that will help you.

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CHAPTER IV

Exercise

It is true that very few scale the heights of wisdom, though many start gaily on the journey, and that those who get any distance do so at the cost of toil, loss of breath, weariness, and giddiness; this, however, does not prove that there is anything inaccessible to the human intellect, but only that the steps are not well disposed, or are insufficient, dangerous, and in bad repair — in other words, that the method is complicated. — Johann Amos Comenius.

Exercises. — 1. Should pupils in geography draw their first maps by tracing them on paper laid over the maps in the textbook? Why or why not?

2. Which is the better method for learning the pronunciation of a foreign language, by rules (such as are found in the first pages of most books in beginners' Latin) or by imitating a teacher? Why?

3. Sketch briefly the method you would like to have an instructor use in teaching you some difficult process in advanced mathematics. In particular, should you like to have him begin with an explanation, or by going through the process slowly and carefully before you, or with a combination of these two plans?

In teaching children, should we emphasize explaining or training? Why?

The next problem — guidance. — Give a child the desire to learn, says Rousseau, and "every method will be a good one." If "well begun is half done," then a lesson well motivated is half taught. Let us suppose that we have been able to stimulate all facilitators and quiet all inhibitors in our pupil, and that we now have somewhere in his brain

a good strong charge of nerve energy with many volts of pressure, ready to flow off along some channel and *form* that channel. Now for the "clear connection, clear through."

But a nervous impulse may spread itself over more than a million paths. Our next problem is, therefore, how to guide the current over the one path that we want to make perfect.

"What responses do I want? To what stimuli?" — The question, *What responses do I want*, should form the first line of every lesson plan. For a guide is no good unless he has a clear idea as to where the road leads. If I were asked to state the outstanding difference between the professional and the unprofessional teacher, it would be that *the professional teacher thinks out clearly just what he is trying to do and has a plan for doing it.* The unprofessional teacher, though a college graduate, perhaps, merely meanders and muddles along.

Exercise the very bond you want. — Even one who knows what he is trying to do may fall down flat in his plan for doing it. One of the most common causes for this apparent failure lies in exercising the wrong connection. A very earnest teacher drilled in grammar with great thoroughness during the first half of the year; but in the second half, she was amazed to find that her pupils were not obeying the grammatical principles they had learned. They did not even put a period after a sentence, but waited till the end of the whole composition was reached and then placed the period. When she reminded them that periods should appear more frequently, they began to stick them in thick, one after each phrase and clause, and some at random. Teaching a science is not teaching an art, teaching principles is not teaching practice, teaching "formal grammar"

is not teaching "good language," and especially is all this true in the teaching of children.

For, consider a case: you want your pupil to say "is not" (or some other correct form) instead of "ain't." Here comes the impulse to speak, adown the brain fiber *S–C* (Fig. 7). Which path of discharge it will take at *C*, the

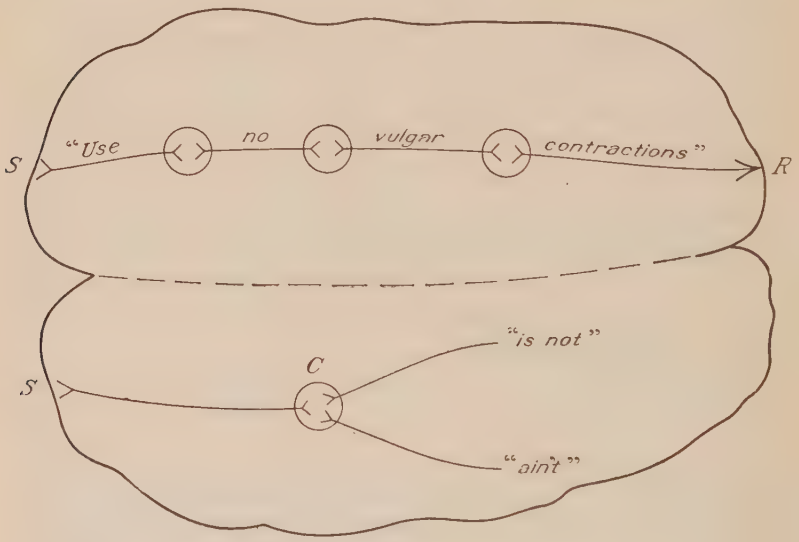

Fig. 7. "Exercise the very bond you want."

"is not" connection or the "ain't" path, will depend very largely on which has been exercised more — and the "street" is likely to take care of that. But up in the top of the pupil's brain is found the result of the teacher's work, forming a rather slender bond for the rule, "Use no vulgar contractions." The pupil may never think of this rule as being connected with his use of *ain't* — nor is it, unless the teacher forms a connection in his brain by making him think of the

two together. And even all this consolidated knowledge may compete but weakly with an "ain't" path that has dug itself in by repetitions almost beyond reckoning.

Now, life is full of such situations. We expect people to *practice* goodness just from hearing it *preached.* "I told you better," says the parent to the erring child. "Yes," the child ought to answer, "but you didn't exercise my *practice* bonds. You should put me through what you want me to do." In school, we teach definitions in arithmetic when we ought to be working with numbers, and expect good citizenship to be learned from reading a history text which says next to nothing about how to be a good citizen.

Practice as you will perform. — One of the surest ways to exercise the very bonds you want is to have the pupil practice as he will finally perform. It would be ideal if, instead of having a single dress rehearsal as the finishing touch in learning a play, we could put on our costumes and practice in them from the very beginning as we learned our lines. In time, we should each *be* a character instead of "acting" it. The school is coming to realize this principle. The pupil washes his teeth at school as he is expected to do it at home; brings in "real" problems from his home, his bank, his community, and practices on them; writes his spelling lesson because, in general, no one need know how to spell a word unless he wants to write it; reads silently because life demands so much silent reading; addresses his "fellow citizens" and learns the game of give and take with them because democratic citizenship demands it.

We learn to do by doing; that is, we learn to do a thing well by doing it well. I find that about two per cent of my students have been taught the alphabet backward as well as forward, though no one of them has found a use for the

backward act. Pupils are learning rules and giving "explanations" in arithmetic with little return for their pains, when they ought to be practicing processes as daily life demands them. And many are they who are translating Latin and forming myriads of bonds for its grammar, thinking they are on the high road to an education — fortunately, a few are — whereas the main net result will be an increase in the stock of useless things memorized.

Two kinds of guidance. — If we are clear as to what responses we want, and intend to exercise the very bonds we want, the next question is that of guidance: How can we guide the nervous charge along the chosen channel? In general, there are two ways of seeing to it that we get just the right response: we may call one way *external guidance* and the other *internal guidance.*

External guidance: by movements. — If you want to form a bond for wiggling your ears, take hold of them and wiggle them. This will give you a feeling (or sensation) of a certain kind; and by and by, when you try from inside your head to reproduce that feeling, your ears will wiggle without external help. The elephant, you recall, is taught by this method to stand on his hind feet; and various other animals, such as the rat and the raccoon, have been educated by the same kind of pedagogy.

One of the prettiest examples of external guidance by movement is found in the French method of training aviators. The airplane has two sets of control levers, so that the learner, who goes up with his teacher, senses through his set of levers every control-movement the teacher makes. Gradually, the learner catches the habit and begins piloting. The teacher permits every movement that is correct, but prevents those that are incorrect, till at length their posi-

tions are reversed: the learner has full control of the machine and the teacher passively senses the movements made by the student.[1]

Would that we could apply this *tandem method* of learning to every kind of lesson. Probably we can apply it, in its essentials, much more widely than we yet think.

Internal guidance: by ideas. — "To be well shaken before taking," was the direction on the medicine bottle in the

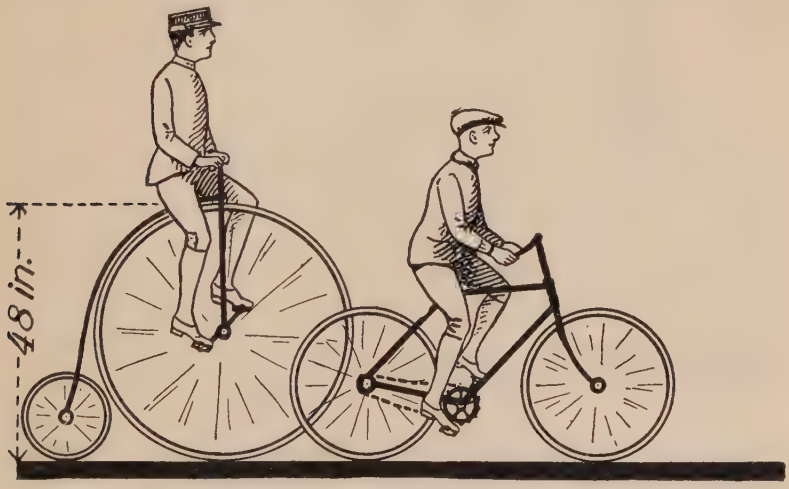

FIG. 8. What *gear* means.[2]

old story. And the caretakers shook the patient! It is not always easy to call up, by words alone, ideas that will guide to the right response.

Suppose you read a statement like this: "The gear of your bicycle is the diameter of a single high wheel which

[1] Ira Samuel Griffith — *Teaching Manual and Industrial Arts*, p. 18.

[2] Figures 8, 9, and 10 are used with the permission of the National Council, Boy Scouts of America.

will roll as far, at each revolution, as your bicycle does at each revolution of the pedals." The desired response is not a movement on your part, but simply that you shall "get the idea," "catch on." To make sure that you do, we may assume that the gear of your bicycle is 76 inches, and ask you to draw on the floor the circumference of the equivalent high wheel. If you do not quite "see the point," you will appreciate the more what a wonderful help a simple

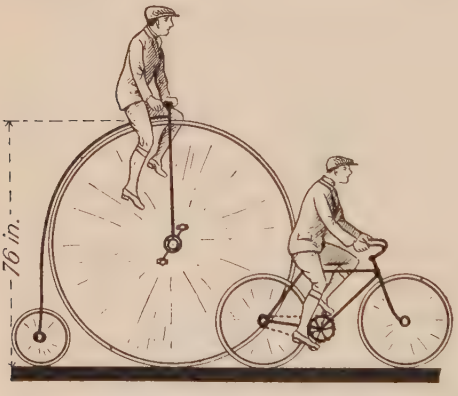

FIG. 9. A gear of 76 inches.

picture is, and why teachers should be able to draw such pictures to guide the responses of their pupils.

Figure 8 shows an old-fashioned bicycle, with a large wheel, 48 inches in diameter, and one of the first safety bicycles. Every time each rider's feet go round, the two bicycles will travel along the ground the same distance. Accordingly, the safety is said to be geared to 48 inches, the diameter of the high wheel.

If your bicycle is geared to 76 inches, the meaning of that is shown in Figure 9. Such a high wheel would have been so very high that the rider could not have touched the pedals.

Guidance by imitation. — If an Amazon parrot, which does not commonly learn to talk, is kept with a talking parrot, the Amazon learns to talk; and experiment shows that he learns faster in this way than he can from a human teacher. Kittens, in imitation of their mother, have been known to stick a paw into a narrow-mouthed milk jug and then lick it, and to sit up and beg for food after their mother had been taught the trick. A red-winged blackbird has learned to crow like a bantam rooster, and even English sparrows, reared with canary birds, learn to sing somewhat like them!

The teacher who does not take advantage of the imitative tendency in children is simply throwing away her ammunition. This kind of guidance lies halfway, as one may say, between the external and the internal. We do not take hold of the child's muscles and move them; but we move as we want him to move, write as we want him to write, speak as we want him to speak, sing as we want him to sing, solve a problem as we want him to solve it. We give him a compelling external copy and a vivid picture-idea at the same time.

In this way we approach closely that method which is in many respects ideal, the tandem method. When a farmer wants to "break in" a colt, he hitches him up as mate with a well-trained horse. "Take my yoke upon you and learn of me," should be the exhortation of every teacher to his pupil. Make yourself the yokefellow of the child you teach, and do everything as you want him to do it — live as you want him to live.

No guidance: trial and error. — There are tasks in which it seems impossible to guide the learner into making just the right response at first. Such are the precise holding and mov-

ing of a violin bow, or a tennis racquet, or even a pencil; the pronunciation of a difficult sound, or the singing of a note or a series of them. A newly-hatched chick gets about 20 per cent of the grains it pecks at the first day, over 50 per cent the second day, about 85 per cent after another day or two of practice, and there it seems to reach its limit. This is nature's illustration of the rule the teacher must follow in such cases: *Call forth any crude response you can get at first, and then peck away toward perfection.* As said before, the brain does not develop by elegant and regular steps, but it forms first great ropes and cables of connections that run through its structure like a kind of framework, and it puts in the refinements later. From such an organ we cannot expect, at first, great nicety of response, either mechanical or moral. We must tolerate the crude and coarse, but only temporarily; for practice does not make perfect if we go on practicing in imperfections. We must inhibit the wrong responses as much as we dare without bringing on dire discouragement, and exhort our pupil to strive for the goal.

But there is no such thing as pure trial and error, no learning where we cannot give some guidance if we set our ingenuity at work. Teachers are in general too much afraid of "showing" their pupils and of letting them teach each other. They have the absurd idea that if the pupil only works out *alone* some terrible exercise, or dives deep enough to fish up the answer to the arithmetical problem that is beyond all ordinary comprehension, he will then experience a great influx of strength that will enable him to upset all opposition in that line thereafter; but they are wrong. "It will be better for you if you do it alone," is often not true. "It will be better for both of us if we do it together," is often gospel.

Old nerve channels guide new impulses. — As before said, a new stimulus rouses in the nervous system an impulse which has no channel ready made for it, and so attracts attention. Nevertheless, the new impulse will flow into the readiest old channels, and so the new object will be given some old name, as the automobile was long called a "horseless carriage," and as a little girl called the fire shovel, which was strange to her, a "big black spoon."[1] The same principle holds in the performance of new acts: they will be guided by the old habits that are somewhat like them. He who first puts on skates wants to *walk* in them, the baseball player who begins tennis uses "too much wallop," and so on.

We must take advantage of this for guidance, using the old paths as main lines and building our new learning onto them as branches. A figure 6 is like a figure 1 with a curl at the bottom, 9 is like a 1 with a curl at the top, *d* (written) is only an *a* with a flag pole on it, and so forth. "Read it just as you would tell it to your mother," will help the little reader to give expression. If addition is just a quick way of counting forward, subtraction is just a quick way of counting backward. Ever the new grows out of the old.

To sum up: the fundamental question for all guidance, as soon as we know what we want to teach, is *What related responses can the pupil already make?*

To give guidance is to establish discrimination points. — Although we build onto old brain roads, we must form new ones before we finish. It is a large part of the teacher's work to set guide posts, to establish discrimination marks so that the pupil can tell one road from another and know where to turn off. The boy, in arithmetic, who, after reading his

[1] In psychology, this interpretation of the new in terms of the old is known as *apperception.*

problem, does not know whether to add, subtract, multiply, or divide, is in need of just such training. Here is the very reason why the foundations of a subject must be mastered with great thoroughness before the pupil is allowed to thread his tortuous and confusing way into the upper stories at all. He must first have at least *some* guide marks that he is sure of. He must know better than to say that "a verb is something to eat," or that "Congress is divided into civilized, half-civilized, and savage."[1]

Precepts for giving guidance. — No brief treatment can be exhaustive; but the following precepts for giving guidance, it is hoped, will prove suggestive.

Introduce but one difficulty at a time. "I can lick all o' yez," shouted Pat to a nest of hornets, "if only ye'll fight fair and come at me one at a time!" The same is true of the pupil and his difficulties. Just how much it takes to make a "difficulty" depends on each pupil. But since there is a bond for everything and everything has its bond, the great danger is that the teacher will not analyze the lesson sufficiently to give concentrated attention to each bit of a bond — and have the pupil do so, too. In swimming, the learner must (1) keep up, and (2) make strokes. The swimming master relieves his learner of the first of these troubles by supporting him in some way, and at the same time coaches him in stroking.

The great worry of the teacher is a pupil who loses readiness unless he can do the whole thing at once — play a game of tennis at the start, or a tune on his violin. The practical teacher distinguishes himself by the degree to which he can invent exercises that drill in one simple step at a time and yet satisfy the pupil's desire to "play the game."

[1] From Mark Twain's *English as She Is Spoke.*

For example, the skillful teacher of tennis, instead of letting the learner run a risk of fixing a lot of bad habits by going into the game at the beginning, may get him to practice the grip on the racquet and the making of a simple stroke by batting the ball up against a high wall and seeing how long he can keep it going.

Give guidance that is positive, definite, detailed. "Take quite a lot of flour," said the old cook to the young housewife, "more than you'd think of butter, some eggs, and

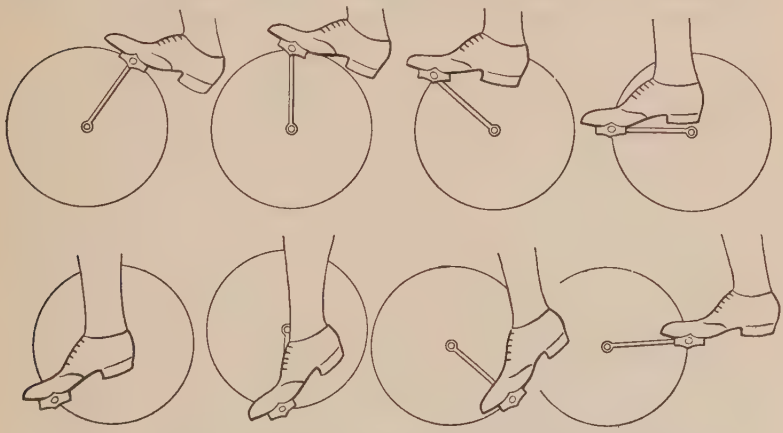

Fig. 10. How the Boy Scout is taught to pedal his bicycle.

enough salt to make it good." Some teachers are almost as bad. Let us see how a Boy Scout is taught to pedal his bicycle (Figure 10). The ball of the foot, not the hollow of it, is placed on the pedal, and the ankle bends so that the downward push on the pedal begins before it has reached its high point and continues after it has reached its low point. A poor teacher would merely remark to a beginner, "Don't keep your ankle so stiff." Such guidance would be *negative, indefinite,* and *without detail.*

To tell a child that her "stitching is careless," that she has "poorly constructed joinings," that the "finish is clumsy," that she shows "lack of neatness" or "carelessness in putting things together," that her first, second, third, fourth, and fifth faults, in the order of their importance, are the "position of needle and thread," that "lack of individuality" and "harmony" characterize her work, and that she "has the inability to learn certain stitches" would not, to any great extent, identify for her the bond which she was to form. One judge, a specialist in the teaching of sewing, mentions the "quality" of the stitch. If such an unanalyzed statement were made to a child, would it not be difficult for her to form the proper bond to bring about improvement in this matter, and would it not aid her in so doing if she were told that instead of having poor "quality" her stitches were pulled too tight, or were too loose, or were uneven, or whatever the fault might be? [1]

Foresee and forestall common errors. The teacher is always "working on the levee," always forming channels in the pupil's nervous system, always building up banks in the form of inhibitors to keep the nerve currents from rushing out of their courses. He must be like the good Dutch dike-master and get there before the bank is broken. The modern method of dealing with crime is to prevent it. The modern method of dealing with errors is to prevent them — so far as we can.

For example, we all know that pupils tend to misspell *separate* and *grammar* and *scissors;* that in the first grade, the figures get turned round so that they face the wrong way — 3 looking like a capital E, and so on; and that certain barbarisms always crop up in language. The preventive is to present our work, from the start, with emphasis on the correct form just where the danger points are. *But do not present the wrong forms* unless you know your pupils have already been victimized by them; many of these wrong forms are like forbidden fruit, wonderfully seductive when once our attention is called to them.

[1] Katharine Murdoch — *The Measurement of Certain Elements of Hand Sewing*, p. 61. Bureau of Publications, Columbia University.

This foreseeing and forestalling of errors has become a science in itself. In at least one system of writing there are published photo-engravings of common faults peculiar to each letter, to show the teacher just where to lay the stress on the correct form when first she places it before her class.

Encourage prevision by the pupil. This is the principle of keeping two jumps ahead of the game. Just as you must, at first, look ahead for your pupil, so he must learn to look ahead for himself. It was a great advantage to the upper animals when they acquired eyes, and could see instead of having to blunder ahead blindly. One important reason for so much muddling and blundering by our pupils is that they either do not see what is coming next, or they are not ready for it when it piles up before them. In reading, as the pupil speaks one phrase he must, with his eye, be scooping up the next one. As he speaks or writes one word or sentence, his thoughts must be prospecting ahead, preparing the next. The very spirit of speed in typewriting lies in letting the mind run over, in a quick, anticipatory way, what is to be written next. Life itself, if we live well, is largely a matter of looking ahead. But a word of warning here: do not expect prevision nor speed from a beginner. "Introduce but one difficulty at a time." Now, speed itself is a difficulty. In the beginning, go slow, work for *accuracy*, and let speed, for the most part, take care of itself. Prevision comes only with practice: the old road reminds us which turn is coming next.

Get the right response, then exercise in it. One who has poor guidance in the beginning and so is confused in his responses, who (for example) does not discriminate between *af*fect and *ef*fect, is likely to go on blundering. Through all the years of his life such a one may run a fifty-fifty

chance of using the wrong word. This is one of the incidental curses of our public school policy of attempting too much; the pupil's nervous system becomes like a bed of sand, marked superficially by many shallow channels that lead nowhere.

First, *guidance*, to print the pattern on the child's mind.

Second, *drill*, to deepen the channels.

The laws of intensity, frequency, and recency. — The rapidity with which a bond is formed depends on the amount of nerve energy that passes over it; and this depends on the

Fig. 11. A suggestion as to how to arrange for drill periods. (From p. 75 of E. L. Thorndike's *The New Methods in Arithmetic.*)

intensity and frequency of the nervous current. Our *intense* experiences — fires, whippings, near-drownings, commencements, and so on — start gulley-washing freshets of feeling along our nerve channels. And the nerve gulleys last: we can "never forget." Readiness results in retention. But if we kept our pupil in a high tension of feeling all day, he would go to bed at night prostrated. We must depend on milder means.

This milder means is frequency, repetition with a reasonable degree of interest; for repetition without interest is as nearly useless as having a machine to move your limbs when you want exercise. Many experiments have been performed to find out how long and how often one should practice any type of work. The general conclusion is

Avoid fatigue. Have frequent, brief practice periods which, as mastery approaches, grow shorter and farther between. Figure 11, in which each vertical line represents a drill period, gives a suggestion of how we should contrive to have our drill-matter appear and reappear, for decreasing periods at increasing intervals, until it is well stamped in.

But knowledge decays. The channels close with time. We get "out of practice." It needs a fresh rehearsal to make our learning fresh — the law of *recency*. We review our pupils in decimals in order that they may have the right bonds ready to work in percentage and we review in arithmetic before they take up algebra.

Change or confusion of stimuli.— If we could be sure, after we have drilled in a set of bonds, that they would always be touched off by the same stimuli we have used in our drill, it would ease our burden greatly. But we cannot always have our pupils practice as they will perform. They will be expected to give the same response to stimuli that are very different, or different responses to situations that are much the same.

Toadstools and mushrooms, wood alcohol and the ordinary kind, oysters in season and out of season, wires alive and wires dead, different makes of automobile, or of typewriter, or even of pens, ink, and paper, furnish samples of stimuli which, though seeming the same, may demand very different responses.

A more common cause of breakdown in response is that the situation to which our pupil has been responding has so many elements added to it or subtracted from it that he either does not recognize it or is overpowered by it. The large audience may make the little orator forget the piece he has practiced only before his teacher. Demosthenes

took the roaring ocean as an audience, and Webster practiced before the beasts in the barn.

But to pull us through any and every plight of this kind, the king rule is to have the pupil practice under the conditions of final performance. It is for this reason that normal schools have a practice school, that the young physician spends his year as an interne in some hospital, and that the business student, as he approaches graduation, spends at least a few weeks in an office.

How thoroughly shall we teach? — No simple and single answer can be given to the question, *How thoroughly shall we teach?* unless it is *According to your purpose.* That subjects are sometimes overtaught there is no doubt. Penmanship, for example, has received in many schools an amount of time and attention out of all proportion to its worth.

But what the teacher wants to know is, how thoroughly he must drill in any particular bond to make it last. And here it is safe to say that the vulgar fault of the great herd of us is under teaching. It is not enough that our pupil shall just get through his performance *once* without an error. If the feat is an essential part of his course of progress, he should have it on tap, as a good showman does his trick, ready to "throw" it on signal.

And finally, it is wise, at critical points, to train the pupil up to the performance of harder tasks than he will ever meet outside; for it needs, as some one has so well expressed it, "six-foot training for a five-foot jump."

CLASS EXERCISES

I

Rosamond's Bower

Figure 12 is said to represent the maze at Woodstock, in which King Henry II placed Fair Rosamond to protect her from the jealous Queen.

Starting at any point on the border, follow any open road — but cross no line — and see if you can reach Rosamond's bower, at the center. If you succeed in reaching the center, try to back-track your way out.

How many trials did you make before you made your way in and out by the same route, as short and direct, probably, as can be found? How many rehearsals are necessary to fix this route so that you can travel it with ease?

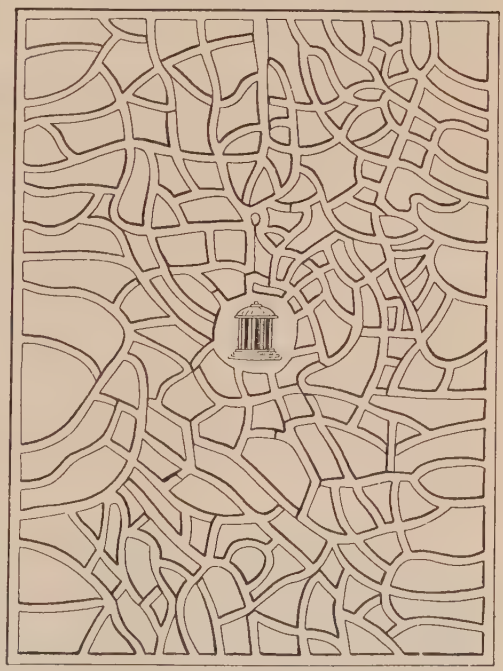

Fig. 12. Rosamond's Bower.

How much time or how many trials would have been saved if you had had a good guide in the beginning?

How is it that any boy can set up and operate a wireless receiving station now, whereas geniuses were much puzzled about it in the beginning? If a boy wants to set up such a station, but knows nothing about it, what would you advise him to do first?

II

Let each member of the class choose some one of the common branches and select from it two classes of problems in learning: first, those in which careful guidance is needed, preceding drill, to get the correct response from a pupil; and second, those in which it is presumably easy to get the right response, and where drill only needs to be thought of.

Follow with reports and discussion.

FOR FURTHER STUDY

1. Animal trainers find that each trick must be done in just the same way day after day, — no deviation. Tell why you think this is true. Which do you think could make the more progress if there were many variations in stimuli from day to day, children of low or of high intelligence? Why?

2. "Lay down, dog, lay down," said a man to a dog. "Sir," said the schoolmistress who owned the animal, "you will have to say '*lie* down' to that dog if you want him to obey; he was trained in Boston." Could there be any truth in such a statement?

3. What kind of guidance is given by a moving picture which shows in detail the performance of the act to be learned? What advantage in having the performance greatly slowed down on the screen?

4. Place your hand on a book as if in position for striking keys, all finger tips touching. Tap with your first and third fingers at once, then with middle and little fingers at once, keeping the other fingers at rest on the book while two are tapping. Can you do it slowly? Rapidly? What does this show?

5. Would you rather memorize a selection first and be trained in its delivery afterward, or have training in expression while you learn it? Why?

6. Show the advantage, from the standpoint of guidance, of completion exercises, such as —

Help the weak if you —— strong,
Own a fault if you —— wrong.

7. Show how you would introduce but one difficulty at a time in teaching a beginner some act which you are master of, such as pitching a baseball, playing a card game, skating, crocheting, simple sewing, dancing, etc.

8. List the probable errors which you would try most to guard against in teaching the act selected in No. 7. Do you think you could improve your list by keeping a record, as you coached learners or performed some experiment with them or examined samples of their work?

9. Show how, as you review a class in the multiplication tables, you could discover the bonds that needed most exercise, and isolate them for special practice. (Hint. — Consider the use of cards with one combination on each.)

10. State all the advantages you can discover in the tandem method of learning — such as readiness, practicing as one will perform, forming no useless bonds, etc.

Could you invent a machine that would enable you to use the tandem method in teaching a pupil to write?

11. It is claimed that special finger exercises and stretchings will produce a benefit, for a piano student, that cannot be secured by practice on the keyboard. Why should this be? Can you think of any other cases where it may be an advantage *not* to practice as one is to perform.

12. Should a student of a foreign language have a translation to help him with his first translating? Why or why not?

13. A French baby made use of one of his babblings, "Atta," as a first step toward the pronounciation of the word "Adieu." What does this illustrate in the relations of old bonds to new? Should the response have been encouraged? Why or why not?

14. The younger the child, the more must corporal punishment be used. Discuss this. Compare the numerous methods that can be used for developing inhibitors in older children, with the limited ways of doing it in the very young.

15. Teachers of folk dancing say that it is difficult to get the right response from students by giving them printed directions;

that they learn much more quickly by imitation or personal direction. Why should this be?

16. Collect a number of instances which show that "to give guidance is to establish discrimination points." For instance, to give guidance in the making of a good, open *e*, we discriminate between this and a closed *e*, or an *i*.

17. When a class is memorizing a poem by use of the blackboard, how should you regard the plan of leaving the last word of each line in its appropriate place on the board, omitting the rest? Why?

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CHAPTER V

Effect

A dog was caught removing an egg from the nest. His mistress seldom had occasion to scold, but made this an occasion. She took the egg from him, and making much ado over it, scolded him vigorously until the dog fairly cried. Then she tested him by laying the egg at his nose. When he attempted to pick it up, she scolded and threatened him. The lesson was learned. Thereafter, whenever the dog saw an egg, he would slink away as though he had been whipped.[1] — Hannah K. Heller.

Exercises. — 1. Shaler says that a dog which has had "an unsavory or painful experience with a skunk or a porcupine" is likely to keep away from these animals for a long time afterward. Men have frequently been cured of a fondness for alcoholic drinks, as dogs have of sucking eggs, by the secret addition of some drug that produced vomiting. A snake charmer, on being severely bitten, refused to do any more charming. Plutarch says that an impudent young fellow who had kicked Socrates was nicknamed "the kicker" by his companions, and so reviled by all that he went and hung himself.

Try to explain these cases. What do you think goes on in the brain of the subject of such an experience?

2. Give such cases as you can, from your own observation or experience, in or out of school, to show what influence the *agreeable or disagreeable effect* of an act has on the further practice or learning of it. Notice that all the examples above show disagreeable effects. Try to include in your list some of the agreeable kind.

Readiness, Exercise, and Effect are the three prime laws of learning. In the two preceding chapters we have discussed Readiness and Exercise. We will now take up Effect.

[1] From a class paper.

What is Effect? — By *effect* is meant the pleasure or discomfort, the satisfaction or annoyance, that accompanies or follows any act. *Pleasure favors the bonds that yield it,* and the opposite of pleasure has the opposite effect. "You must never let a horse run away even once," said the driver of a fine but frisky pair of bays, "for once he gets the thrill of it, he will do it again at every chance." On the other hand, an elephant is often afraid of a mouse, and the reason is said to be that the mouse runs up the inside of his trunk to get the grain that clings there.

What is "effect" in the brain? — We know beyond doubt that pleasure aids digestion and dolor delays it; the X-ray shows that the stomach of a worried cat refuses to work. But there are greater wonders; a mother, on seeing her baby's fingers cut off by accident, found the corresponding fingers of her own hand red, swollen, and painful. "They looked and felt as if they too had been crushed." [1] Now, if pleasure and dolor can do so much with such physiological processes, it seems likely that they may be very influential in the forming of bonds in the brain.

But how can pleasure help? By sending more blood to the brain cells that are active. By increasing the charge of nervous energy that is "exploded." By drawing off this flow of energy from all wrong channels and guiding it into the one right one.[2]

Let us take as an illustration of nerve energy guided by pleasure, a case from Shinn's *Biography of a Baby.*[3]

[1] Frances Gulick Jewett — *Control of Body and Mind,* Ch. XVIII. Ginn and Company.

[2] And possibly in other ways. Personally, I think it very likely that there is a certain chemical action in the brain when we feel pleasure, a sort of *affective deposit* which is not active at other times.

[3] Page 60.

Now suppose the aimless impulse straying to the baby's eye muscles, making the eyes roam hither and yon; but as they reach a certain position, they fall upon a lighted surface, and a pleasant brightness flows back into the consciousness; and something stirs within that has power to send an intenser current through these same fibers. For the time, at least, that channel is deepened, the wandering impulses are drained into it, and the eye muscles are held steady in that position. And, in fact, with the beginning of staring the irregular movements of head and eyes did decline, and gradually disappear.

A further note reads:

But the next day (27th day after birth), at the sound of chords, strongly struck, she hushed when fretting with hunger, and listened quietly for five minutes — her first pleasant experience through the sense of hearing.

On the other hand it appears that unwholesome feelings may do actual physical harm to the brain cells. The brains of rabbits which had been frightened by a dog, but neither injured nor chased, were found, when the animals were killed soon after, to have suffered definite damage from the experience.

The schoolmaster must use Nature's method. — Plato says somewhere that taking pleasure means passing from a worse state to a better. Certainly, that has been true for the human race as a whole. Do you think the race, or any man of us, would continue for long if it, or he, followed the policy of persistently doing what was most painful? No; through countless generations pleasure has been Nature's way of saying, "Do this and prosper," while the warning of pain has been, "Stop that or perish."

We pay little attention to that which is neither agreeable nor disagreeable, but neutral. A spider will at first drop off his web when a tuning fork is sounded near him; but after a time, the spider sits serenely through this monotone music — why should he care for what makes no difference?

In the same way, pupils may almost drop off their seats the first time the teacher scolds; but if she does it repeatedly and nothing further happens, they learn to listen to her "chin music" indifferently.

The public school must apply the same rule of pleasure and discomfort that holds in the school of nature, but apply it more evenly and less extremely. Nature seems at times to suspend the rules and give us license to eat, drink, and be merry as we will — but then suddenly shows us that we have been acting on pain of death. The improved environment of the school — and that means mainly yourself, teacher — should see that no false brain channel is open long, before discomfort dams it; and that the opening of each new and approved way of discharge brings its return flush of pleasure by way of celebration, even if it is only the teacher's cheerful "That's right; keep it up."

Applying the law of Effect.— The simple rule is, *Make pleasant what is to be sought, and unpleasant what is to be shunned.*

Figure 13 shows that white rats learned faster when both facilitator and inhibitor were used — reward and punishment — than when either operated alone. The reward was food, the punishment a mild electric shock. Almost certainly this is true of children also. But we must remember that a sensitive child is very different from an insensitive animal; for the child, the feeling of failure, the looks of classmates, a word of reproof from the teacher, — these are often enough to cause serious discomfort or even suffering.

If we try to dam all the ways but one by which water can escape, we shall be kept busy with our damming and

still have no very strong outflow in that one direction; but if we open one deep channel and draw the discharge into it, the rest will largely take care of itself. Nerve energy

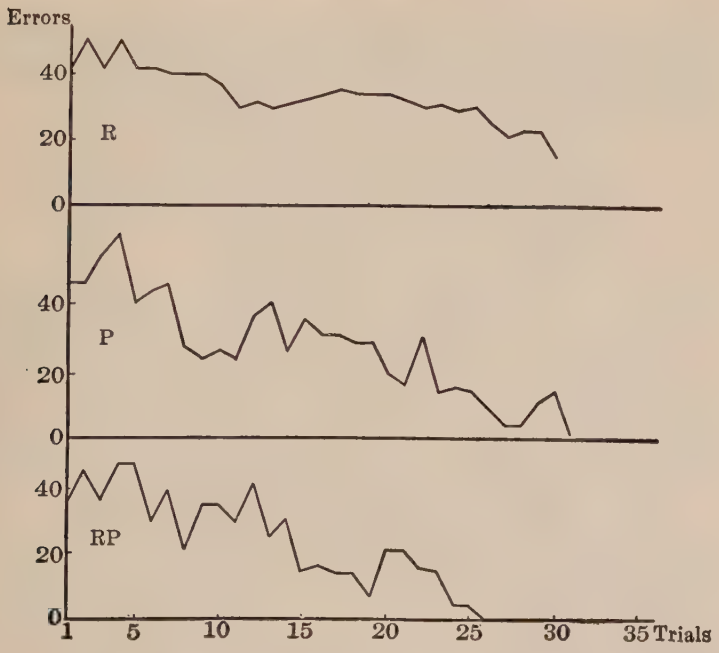

Fig. 13. (From page 200 of Watson's *Behavior*. Henry Holt and Company.) Showing that white rats learned faster when both reward and punishment were used than when either alone was used.

R, with reward alone.

P, with punishment alone.

RP, with both reward and punishment.

The figures along the base line give the number of the series of trials necessary to form the habit. A series consisted of 20 trials.

behaves much like water. The modern method is to open the channel for more positive expression and to pay less attention to building the dams of inhibition. A study of

the detail of Figure 14 will reveal a variety of inhibitors in use in the school of long ago. Contrast with methods used in the schools of to-day.

FIG. 14. A late eighteenth-century German school. Illustrating an application of the law of Effect. (After a picture in the German School Museum in Berlin. From Cubberley's *The History of Education*,[1] page 564.)

We must also be careful to see that some connection is formed between the response and the effect administered. A boy comes late to school. He whispers to find out where the lesson is. Later, he fails to recite. He is punished —

[1] In the Riverside Textbooks in Education, published by Houghton Mifflin Company, copyright 1920. Used by permission of the publishers.

for which of these acts? He reports at home that he does not know what he was punished for. With a sincere pupil and a good teacher, this would never happen.

The sources of Effect are like those of Readiness.— It is apparent that Readiness and Effect are in many respects similar. They are similar as to source. When we clap our hands for a pupil who has done well, we are appealing to an instinct to produce a pleasant effect. When he reads so well that we grant him more books to read, we are appealing to an ability. When the lesson is so well prepared that we have time to play the familiar geography game or sing the favorite songs, we are producing a pleasant effect by an appeal to old habit bonds. *Instinct, ability, habit:* the tale is told.

Here is another reason why we must live with our pupils until we know them: in no other way can we understand intimately just how and how much to thwart or gratify their habits, abilities, and instincts in order to cause them discomfort or pleasure to the right degree.

How secure the desired Effect? — To answer this question, we need to pass in review a list of factors very similar to those considered in connection with Readiness. These are *environment, bodily and mental condition of the learner, personality of the teacher, a suitable task, a suitable special stimulus,* and *a suitable result.*

We shall take them up in order as listed.

Environment. A wild animal, if caged or penned, may not only refuse to learn, but may actually pine and die. Many children suffer similarly. "The kicker" who kicked Socrates found himself too unhappy to live in his social environment. On the other hand, a man heard some indifferent stories told while music of which he was fond was

being played and the stories seemed very good. A stimulating social environment in the form of a sympathetic audience may so affect a singer or speaker as to make him perform as if inspired.

In brief, we must consider both the physical and the social environment; and we must not only keep them negatively free from any interfering influence, but we must make them positively helpful.

Honor and dishonor, standing well or standing ill in the eyes of others, usually produce a stronger effect than any other forces at the teacher's command. To be condemned or looked down upon by one's mates hurts much more than a whipping — another example of the tremendous power of the herd instinct.

Condition of the learner. A celebrated music master makes every student smile just before going out to sing to an audience. This is one of the best practical tests of condition, Can the learner smile at his lesson?

Most human learning shows "plateaus," halting places, where there is no improvement for days, or weeks, or months. Animal learning is usually free from such stagnant periods. One explanation[1] for this seems to be that the human learner is more likely to get out of condition than is a well-kept animal. The human gets fatigued, or "goes stale."

Going stale may result from practicing too long, or too frequently, or too fast, or under too much pressure; or fatigue of restraint may result from having to do "this old thing" all the time when the pupil wants to do that new

[1] But this is probably not the only explanation; the human brain has high-level centers of organization and control which the animal brain lacks, and I take it that these higher centers may come into their own rather suddenly at times, causing a rapid improvement which otherwise would never have taken place.

thing at least a part of the time. Recreation pays. Experiment shows that one who leaves his task for a time may come back to it in such fine fettle that he soon beats every old record he has ever made.

The personal factor. Here we can hardly tell whether we are dealing with Readiness or Effect. One of my students so hated her seventh grade teacher that she could scarcely be forced to go to school, and the next year so loved her eighth grade teacher that nothing could induce her to miss a day. The terrible teacher may make every task a terror, and the lovable one can raise dead facts to life.

A suitable task. In addition to selecting work for which the pupil has some natural taste and ability, we must provide variety, that is, avoid monotony; and grade carefully as to difficulty.

"Mouse, mouse, thirty days mouse. To-day, no!" said a little foreign-born pupil by way of revolt against the too long continuance of the story of "The Lion and the Mouse." Even the finest project may go stale. This pupil felt much as did the soldier boy who told me he had had beans for breakfast eighty-nine days in succession.

Cats and animal trainers can show teachers how to avoid discouragement from over difficulty, that is, how to hearten the pupil with the flush of success by introducing but one difficulty at a time. A good mouser at first brings dead mice for her kittens, which growl and stick their teeth into their prey. Next, disabled mice are presented, and of course the kittens triumph. Finally, the mother brings off a bout with an uninjured mouse; but if he escapes, she brings him back. So grows the kitten's confidence and sense of mastery. Trainers of terriers first try them on

rats with drawn teeth. When the little dogs have killed some of these, they come at length to the point where they fear no rat, even with full dental equipment.

A suitable special stimulus. Yerkes found in animal-learning a fact which also applies to child-learning: the easier the habit we are teaching, the stronger the stimulus that causes its quick acquisition; the more difficult the learning, the weaker must be the stimulus that causes quick acquisition — and of course quick acquisition means, with children, a happy effect. For a simple bit of learning, such as standing and sitting properly, we can "put on the pressure"; but in a complex subject, — such as the handling of numbers, — stern scoldings and other strong stimuli would only cause confusion and discouragement.

Also, we must try to find stimuli that will result in satisfaction *all through*, and not merely stimulate at the beginning of the work. Business houses find that petty devices to stimulate their workmen soon lose interest. They get better and more lasting results from such plans as profit-sharing, insuring their workmen, permitting them a part ownership in the business, and so forth. Herein lies a lesson for the school: it must take the children into partnership, let them help run the job, and give them a share of the educational "profits."

A suitable result. "I would rather study that conjugation now than to write it out half a dozen times after school," said a boy as he turned to his Latin lesson. The good shepherd leads; but he has also a dog and a crook, and something must happen to the sheep that stray.

Sometimes, indeed, we may purposely let a pupil take a wrong method, especially if he is headstrong or has a great deal of initiative, just to let him know how it feels to be

thwarted, to guard him against similar errors in the future, and to induce in him a greater readiness for the right way.

Nevertheless, emphasis should be laid on positive effects rather than negative, and the one great positive result is success. As honor is the great gratifier of the social instinct, so is success the satisfier of the instinct of self-assertion.

We can afford to tolerate a low standard for a time, especially when starting a subject, if we can purchase at that price the masterful self-assurance that the careful mother cat builds up in her kittens.

One of the best uses to which we can put our educational measuring scales is that of making success evident, of showing the pupil, from time to time, that he is outdoing his old self, and that his is "the glory of going on."

CLASS EXERCISES

I

The object of this exercise is to enable you to compare the effect of working successfully with that of working unsuccessfully.

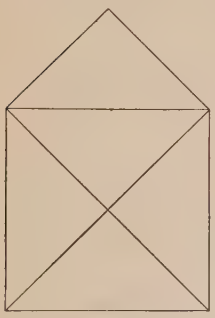

FIG. 15

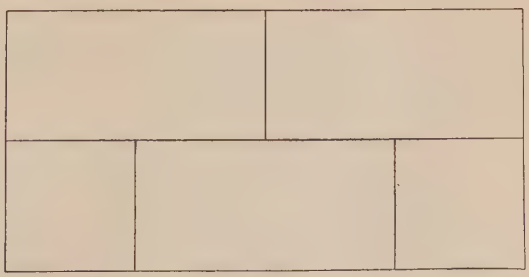

FIG. 16

When the instructor directs (but not before), spend seven minutes trying to make Figure 15 without removing your pencil

from the paper and without retracing a line. As soon as you have discovered one way, try, until the time is up, to find others. Make note of your feelings throughout, and especially at the time of success. Do you think it will require much effort to enable you to remember the successful method?

Similarly, spend seven minutes trying to make Figure 16 in three strokes, that is, without removing pencil from paper more than three times, and without retracing. (This problem is believed to be insoluble.) Compare your feeling, especially at the close of the seven-minute period, with that aroused by wrestling with Figure 15. Should you care to have more problems like Figure 15? Like Figure 16?

What is likely to be the effect on a pupil if he believes, from the beginning, that the solution of a problem is (for him) useless or impossible?

II

Follow the directions given for the Class Exercise at the close of Chapter III, but take as your topic for investigation, *Means of Securing Effect.* Keep in mind, as you visit, both agreeable and disagreeable effects on the pupils.

FOR FURTHER STUDY

1. Mosso, watching a woman's brain through a hole in her skull, found that the brain enlarged and showed a stronger pulse beat when she was frightened by seeing a skull among his books. What does this have to do with "effect"?

2. A dog approached some bubbles on a carpet, but was frightened almost out of his wits when one burst. The second time this happened, he rushed out of the room and refused to enter again. Explain.

3. A boy was much pleased when he found that a knowledge of algebra would enable him to solve problems that he could not do by arithmetic, and went eagerly to work at his algebra lesson. What has this sense of power to do with the self-assertive instinct? Try to give other instances.

4. There is much theoretical objection made to keeping pupils in after school to master neglected lessons. Try to get at the matter practically. Were you ever kept in for such a purpose? If so, what effect did it have on you? If you know of the experience of others, give it.

5. A prize was offered for the best essay on "How to Manage a Husband." A woman is said to have won the prize by an essay of three words, "Feed the brute." Can this be taken seriously? Compare with the method of training animals by an invariable reward of feeding.

6. Why is it so hard to bring under control a school that has even once found it can defy the teacher?

7. A student who had failed in his year's work compelled himself to remain and hear the applause received by the successful. Another, who had completed an unsuccessful semester, placed in his room the motto, "Fool, remember last semester, and work." Were these students wise or foolish? Why?

8. A pupil who had much natural talent in drawing lost interest in water-color work when he failed to do as well as his mates. Later, in another school, his interest in drawing revived when he found he could do better than the pupils there; but he still dislikes water-color work. Comment on this. How might a standard measuring scale have helped the situation?

9. A South African negro boy ran away frightened on first seeing a man mark on a blackboard with white chalk, but later ventured back to see the "magic stick." In his educated manhood, he said this had made the greatest impression on his mind of all that he had ever experienced. Explain why children are so elated at the privilege of marking on the board.

10. Suggest as many ways as you can by which pupils may be "taken into partnership" in running the school, — such as having a bright pupil serve sometimes as teacher, encouraging pupils to aid in receiving visitors, permitting them to coöperate in the school management, and so on.

11. Clever and successful hostesses are said to keep well informed as to the details of the lives of those whom they entertain.

Business men often do the same with their customers. What lesson here for the teacher who would make her lessons produce the maximum "effect"?

12. Plato says that if a man is brought up from childhood to hear good music, he will like it; but that if trained "in the sweet and vulgar music," he will dislike the better kind. On what is he counting for "effect," on ability, habit, or what? Do you think we can train for "effect," so that what was at first indifferent or disagreeable will become agreeable? If so, how?

13. In Salt Lake City, tickets for baseball games were given out to the boys and girls who had attained an average of 85 per cent or more in scholarship and deportment for the week. It was reported that "since the tickets were first distributed a sudden and remarkable improvement in study and conduct has been observed." Would you advise making such practices widespread? Give reasons.

14. It has been suggested that children be paid a small sum (say at the rate of a few cents a day) for attending school. Tell why you think this should or should not be done.

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CHAPTER VI

A General Plan for the Forming of Any Set of Bonds

Exercises. — 1. Tell in some detail how you have taught (or would teach) any trick or other simple piece of learning to a child or a lower animal.

What responses did you want? To what stimuli?

On what did you rely to call out and fix these responses?

2. Make a list of the chief points which you think should appear in every lesson plan. Base this chiefly on a review of what has preceded.

You now know the chief laws of learning. The next need is to form them into a plan which we can apply to the teaching of every branch, and of every lesson. The purpose of this chapter is to produce such a plan.

The method of the animal trainer. — When an animal trainer wants to teach one of his pets a new trick, he must ask himself such questions as the following:

1. "What responses do I want, and to what situations?" It is of course useless for him to want any responses that are foreign to the animal's nature; a lion can be trained to sit on a stool, but no one ever trained a lion to climb a rope.

2. "What responses does the animal naturally make to such situations?" That is, what old bonds does he have that are like the new ones wanted?

3. "How pass, by very gradual steps, from his present responses to the ones I want?" The lion trainer first places

a stick in the cage, puts meat on it, rubs the lion with it, shortens it daily, then uses his hand in place of the stick. He next puts a collar and chain on Leo while the animal is asleep, then shoves an empty chair inside the cage. The lion springs but cannot reach the chair. The trainer occupies the chair, first with the lion chained, then unchained. A fight may ensue. The old stick is used again; first for blows, if necessary, and then for petting. Later, the hand is substituted. After two weeks of growing familiarity, the trainer can raise the paw of his pet. Gradually, the lion learns to back up at command, to lie down, to sit up, and to do other tricks. Even then, care must be taken when he passes from his small cage to the large and crowded arena, or he will go wild — much wilder than a small boy who has practiced in his own little schoolroom and then attempts to perform in a large auditorium filled with people.[1]

The method of the teacher. — The questions asked above by the animal trainer (and also his procedure) are important for the teacher too. Educating a child is more complex, but not necessarily more difficult, than training a lower animal. In the numbered sections below are taken up the questions that appear to be most important for the teacher to ask as a general guide to the teaching of any kind of lesson.

1. *Just what bonds do I want to build?* — What responses are wanted? To what stimuli?

As we have already learned, we must hold steadily in mind the stimuli, the situations that the world will force on our little graduate, and let him practice now in school as he will have to perform hereafter out of school.

[1] This very brief account is condensed from the more detailed description found in Frank C. Bostock's *Training of Wild Animals*, pp. 125–150.

2. *What related responses can the learner make already?* — When he begins reading, he knows many words by sound, and responds to them when he hears them; he has only to learn to respond to them by sight. If one knows how to speak a foreign language — and English is a "foreign language" to a child — learning to read it is not difficult.

3. *How shall we pass from the bonds already formed to the bonds to be formed, introducing but one difficulty at a time?* — The ideal method is the tandem method, for it gives perfect guidance, and introduces only so much difficulty at any point as the learner is ready to shoulder and carry. We should work as nearly tandem with our pupil as we can.

As the introduction of more than one difficulty at a time is probably the most common error committed in teaching, let us halt a little here (so that I shall not commit this very error on you at this point).

a. From sensori-motor bonds to high-level bonds. Let us recall that the sensori-motor connections are in the lower part of the brain, and that all education, in whatever branch, should start right there. The only sensible way to begin an education is to start with the sense organs and let them set off movements of some kind.

Further, when dealing with minds immature or a bit slow, we must take care to pass by very easy stages from sensori-motor to high-level. Suppose we are teaching a pupil that three and two are five. We (*a*) put down three marbles and two marbles; (*b*) draw three marbles and two marbles on the board; (*c*) use a line only to stand for a marble, drawing three lines and two lines; (*d*) tell him a little arithmetical story that will cause him to see three marbles and two marbles very vividly "in his mind's eye" after much practice; (*e*) get him to think in terms of words only — "Three and two

are five"; and finally (*f*) train him to respond to the stimulus, "Three and two," by answering "Five," without any further thinking or ado about it.

He is now ready to take up problems in which he must use this "three and two" bond.

b. Relation of the desired bonds to each other. This is one of the most difficult problems in all education. It will help to clear the matter if we note, with regard to the relations of bonds to each other, four possible arrangements:

Simple and single.
In series.
In trunk line.
In inclusive units.

These are not to be thought of as four sharply separated plans; for they grade into each other. But we shall consider them separately.

Simple and single bonds. This arrangement needs no discussion. In geography, for example, we teach many independent items of information, each with its separate and simple bond: *The earth is round, New York City is a great seaport*, etc. Such connections have little to do with each other. Each response has its own path through the brain.

Bonds in series. We have a good illustration of this in our knowledge of the alphabet; or of any succession of words, such as a poem; or of a succession of acts, such as those that are necessary in the mixing and baking of a cake; or even of a succession of thoughts, such as those that are necessary in proving that the earth is round, or in giving a demonstration in geometry.[1]

[1] In *the first working out* of a proof, there is of course something more than a simple chain of bonds involved; but in passing from point to point as one repeats a familiar demonstration before a class, nothing more is necessary.

How to teach such a series appears to depend on whether the bonds for its separate units have already been formed, so that the chief work left to do is to get these bonds connected into a series; or whether the units themselves have first to be mastered.

An example in which bonds have already been formed for the separate units is that of memorizing a poem. We already know the words, and most of the ideas it contains, so our task is to get these words and ideas connected into a series. In this case, we learn by wholes, repeating the whole thing each time until it is fairly well mastered, after which special attention must be given to sticking points, that is, points where the connection is found to be weak.

Where the separate units in the series are new, and especially if the tandem method cannot be used, so that it is hard to give guidance from point to point, teach but one unit (or at most a few) at a lesson — just enough to make "one difficulty at a time" for the pupil or class you are teaching. For example, Watson taught some rats to thread their way through a maze-like structure, dig through sawdust till they discovered a hidden gateway through a fence, mine through more sawdust till they had found a concealed passage underneath a box, and then make their way up through a hole in the box, which held their food. His "difficulties," which he introduced one at a time, were as follows: (1) box with hole in bottom, no obstructions except its supports; (2) box as before, but with straw to obstruct hole; (3) box with sawdust to obstruct hole; (4) box as in (3) and with fences around it, having entrances obstructed by sawdust; (5) box with obstruction and fences, and with maze-like structure around the whole.

A child who learns to spell *post*, then *postpone*, and then *postponement*, is proceeding in much the same way. So is one who first adds, then adds and carries, and then adds and carries as a part of multiplication. As a rule, all acts of muscular skill are taught by this method.

Trunk line bonds. These are pictured by the plan of a railroad which has a "through line," that is, a trunk line, from which the side lines come out as branches. A very prominent teacher of boxing begins his lessons by teaching such a trunk line bond, that of rotating and reaching. The student stands with feet apart and parallel, rotates his body at the hips so as to throw his right shoulder forward, and reaches out his right hand, palm up. This is alternated with a corresponding movement for the left side and arm. From this first exercise, well drilled in, all others are developed as variations.

The slang question "What's the big idea?" applies here very neatly. This big idea, this trunk line bond, should be taught with great thoroughness. In writing, the big idea is to swing across the page easily and at the same time make up and down movements. The pupil who can do this can soon make all the letters as variations of this general movement. In violin playing, the big idea (to start with) is drawing the bow. In language and grammar, it is the sentence. As we "modify" its subject and predicate and other parts we are simply building modifications, branches, onto the old trunk line bond we start with. In algebra, the big idea is the equation.[1] Teachers of reading

[1] "Algebra," say Rugg and Clark, "*is organized about the equation.* Its method is essentially that of the science of the equation, and *this method does not change* from the beginning to the end of the course." (P. 123 of *Scientific Method in the Reconstruction of Ninth Grade Mathematics.*)

and spelling make use of a trunk line bond on a small scale when they first teach a form, as *at*, and then present:

b
c
h } at
f

In this book, the big idea is *the bond.*

Inclusive units. As you begin learning to typewrite, you have to give particular attention to each letter-key as you strike it. But gradually, such clusters of letters as *t-h-e*, *a-n-d*, etc., begin to hang together, so that you can run them off quickly and easily. As you go on writing, every word you commonly use comes to have its cluster-bond, and even whole sentences, frequently repeated, seem to "write themselves." But if you attempt to typewrite something from a foreign language, though printed in the same familiar alphabet, you "clog," for you have no inclusive-unit bonds with which to manage its words in groups.

What do these inclusive units mean in the nervous system? The letter bonds are controlled by a word center, the word bonds by a phrase center, the phrase bonds by a sentence center. So, when you wish to write *The quick brown fox jumps over the lazy dog* (a sentence containing all the letters of the alphabet), a single strong impulse from your sentence center (Figure 17), radiating out through the lower brain-paths it controls, like a general order going out from headquarters to all the smaller and smaller units of an army, is sufficient to set off the whole performance. Further, while that performance is running itself off, you can go on thinking of what to do next.

Very little of this kind of learning (as it seems to me) is found among the lower animals; but in human learning, you will be able to think of a dozen examples at once.

The essential rule for building up such a hierarchy of bonds is, *Begin at the bottom; go slow; and be thorough.* Beginning at the bottom means teaching each single little bond well before trying to form a group. Get the elementary facts thoroughly in reading, or arithmetic, or beginner's Latin, or chemistry, or any other subject where inclusive

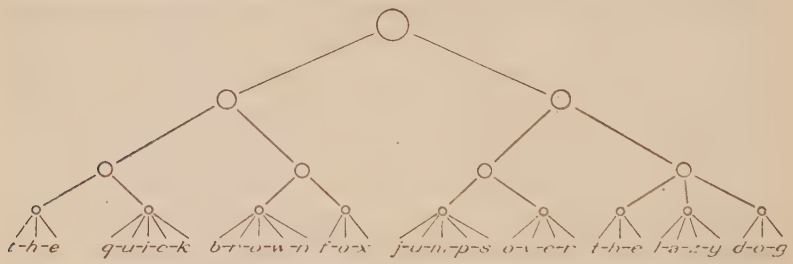

FIG. 17. The arrangement of bonds in inclusive units.

units have to be dealt with, and these facts, later in the course, will seem of themselves to cluster and nest in productive ways, will make nuggets of value, and subsume themselves under principles in a manner most surprising. But let these elements go unmastered, and all the higher structure crumbles as fast as we try to erect it.

c. Which bonds to form first. Teach first the bonds (1) that are easiest and most interesting to learn, (2) that occur most frequently, (3) that prepare for the greatest number of other bonds-to-be.

In primary reading, when we wish to begin teaching the sounds of the letters, shall we teach chiefly vowels or consonants? The consonant bonds are easiest to form, for each

consonant (as a rule) has but one sound; whereas every vowel has several sounds. Further, the consonants occur most frequently in important positions, that is, standing first in the word, or sticking above or below the line of print. And finally, consonant sounds prepare the pupil better for word bonds-to-be; for they give him the skeletons of words, whereas the vowel sounds merely fill in the soft parts. It is even possible to read a language without vowels — or with very few.

Such a guide as the above, while it may not be infallible, is likely to lead us to the best conclusion we can form in advance of experiment.

4. *Readiness.* — How shall we flush with energy the nerve cells to be used? This question has already received its answer (in Chapter III).

5. *Exercise.* — How guide the nerve current repeatedly along the path to be strengthened? How keep it from wandering? How prevent errors and exceptions, that is, the exercise of wrong paths? How use a method that is tandem or near-tandem? (See Chapter IV.)

6. *Effect.* — How make the result satisfying, pleasant to the pupil? (See Chapter V.)

7. *How test essential bonds?* — This we must do to guide our teaching. It is well to think of subject matter, when we have taught it to a pupil, as a number of bonds in his brain, bonds organized into some kind of system. If, when planning our teaching, we answer clearly our first question ("Just what bonds do I want to build?"), we shall know what responses to expect. The ideal test would consist of all these responses, arranged in order from easiest to hardest. By applying it, we could tell just how far we had "brought on" our pupil — or to use a religious phrase, how much we

had edified him, had built up in him that goodly edifice of bonds which is to remain in his brain as a memorial of his educational sojourn with us.

The essentials of a good measuring scale. — A good educational "measuring stick" is in its essentials like a good yardstick or meter stick. To begin with, it is in the outside world, and not wholly in our heads. When the "oldest inhabitant" tells you that this cold winter is not nearly so frigid as one he remembers fifty years ago, the comparison is wholly in his head (subjective), and may not be very accurate; but the yardstick is a thing (objective). It does not change much, and cannot lie unless it has a very able assistant.

As a rule, we measure products in education by samples of themselves, arithmetic by samples of arithmetic, composition by samples of composition, etc., as we measure distance by a sample distance, a yardstick. The way to do a thing is to do it, and the best way to test it, as a rule, is to have it done.

And finally, just as a good height-measuring stick is graduated from zero by definite and equal steps right on up to a point higher than that of the tallest man it is to measure, so a good educational measuring scale should begin at zero and be graduated by definite and equal steps right on up to a point at least as high as can ever be reached by the best pupil it is made to measure.

Outline of a general plan.— In order to keep essential points prominently before us, let us formulate now a general plan for teaching. And to stimulate us to think over each new problem as it rises, let us make the entries in the form of questions.

Outline of a General Plan for the Forming of Any Set of Bonds

1. Just what bonds do I want to build? What responses are wanted, and to what situations? What reactions, and to what stimuli?
2. What related responses can the learner make already?
3. How pass from the bonds already formed to the bonds to be formed, introducing but one difficulty at a time?
   - *a.* What is the relation of the desired bonds to each other?
     - (1) Simple and single?
     - (2) In series?
     - (3) In trunk line?
     - (4) In inclusive units?
   - *b.* How pass from sensori-motor to high-level bonds?
   - *c.* How fix first the bonds
     - (1) that are easiest and most interesting for the learner?
     - (2) that occur most frequently?
     - (3) that prepare for the greatest number of bonds which must be taught later?
4. Readiness: How flush with energy the nerve cells to be used?
5. Exercise:
   - *a.* How guide the nerve current repeatedly along the right path? How approach the tandem method?
   - *b.* How prevent errors and exceptions, that is, the exercise of wrong paths?
   - *c.* How bring the learner to practice as he will perform?
6. Effect: How make the result satisfying (or if necessary, disagreeable) to the learner?
7. How test essential bonds from time to time, to guide the learning?

CLASS EXERCISE

The purpose of the exercise is to illustrate the use of inclusive units in learning. Wait for directions from the instructor. All lines in the figures called for are to be made without removing pencil from paper.

1. In Fig. 18, copy or trace diagram A ten times.

2. Study B, which combines two of these units, and C, which contains three of them.

3. (*a*) Devise a figure composed of four of these units. (*b*) Show how a border could be made, composed of any number of them, following the plan of B.

4. (*a*) Study D. How many of the units does this contain, counting the one in the center? (*b*) Devise a pattern containing nine of the units.

5. (If No. 6 is to be performed, record the time required to solve this problem.) Using D as a unit, invent a pattern composed of five of these D's, one of which shall stand at the center of the figure, as unit A stands at the center of D.

6. Present No. 5 to a group of students who have had no experience with this unit. Be sure to state that the whole line must be made without removing pencil from paper. Compare the time record and method of procedure of this group with that of the experienced group.

7. Show that the decimal system involves the use of inclusive (multiple) units. Suppose that moving a figure one place to the left multiplied it by 100 instead of by 10, etc.

FOR FURTHER STUDY

1. Select several sample lessons, simple ones, from various common branches, and tell just what bonds you think they should include, what responses you would expect, and to what stimuli, when the lessons had been taught.

2. Show how you would pass gradually from sensori-motor bonds to high-level bonds (after the manner shown in the example

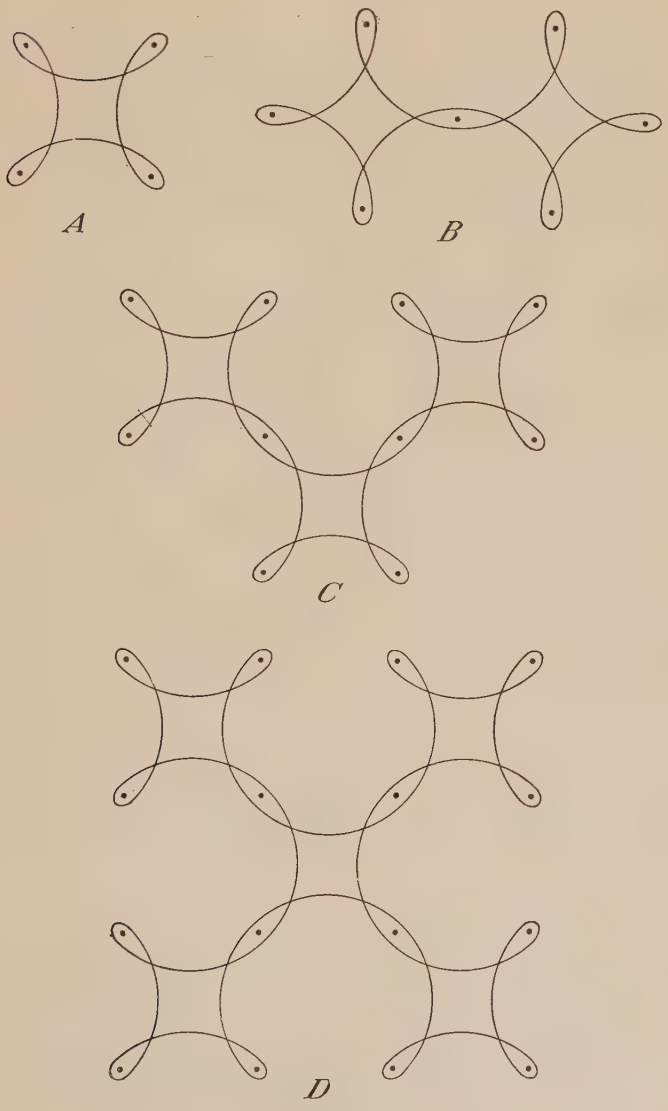

FIG. 18

given, of teaching that three and two are five) in presenting to a class the following: (1) a word, starting with the object for which it is the name; (2) some piece of geographical subject matter, such as a lake (beginning with the actual object); (3) a word in spelling; (4) a story in reading or language (beginning by playing the story); (5) facts of history (beginning with something now going on in your neighborhood).

It is not necessary, in every case, to pass through *all* the steps given in the example in this chapter.

3. Give several original examples of bonds arranged in the four ways discussed in this chapter. Give special attention to trunk line bonds and bonds arranged in inclusive units.

4. In teaching the following tell whether you would proceed by the method of wholes, or by taking one (or a few) units at a time, and why: a memory gem, holding a pen and writing, learning a multiplication table, making a dress, playing baseball, reading (for a beginner), learning the Chinese alphabet.

Give other examples of your own.

5. Give as many cases as you can, from school work or outside, in which the tandem method can be used. For example, consider the teaching of a game of any kind to a friend by playing it with him, holding him responsible for his plays only in so far as he shows that he "knows what he is about."

Some think it good for a child to learn reading by looking on the page while parent or teacher reads easy subject matter, the child following along and pronouncing a word here and there as soon as he can do so and gradually undertaking the reading himself. What do you think of this plan?

6. Have you ever observed what happens when a child is "rushed" in learning reading, beginner's Latin, arithmetic, or any other subject in which bonds must be formed on the plan of inclusive units? If so, describe the case and tell what you would have done about it.

7. Pick up any elementary textbook and observe whether it teaches first the bonds that are easiest and most interesting to learn, that occur most frequently, and that prepare for the greatest

number of bonds-to-be. If so, show how; and if not, criticize it and suggest improvements.

8. Can you think of any cases where lower animals seem to learn by inclusive units? If so, try to explain them; and if not, tell why you think such examples must be rare.

9. Why should beginners work for accuracy rather than speed? (Consider the danger of the nerve current's "running off the track.")

10. Hobhouse taught an elephant to pull a bolt and open the lid of a box by taking her trunk in his hand and guiding it through each movement. Show the likeness of this procedure to the tandem method.

On the seventh trial, the elephant learned to pull the bolt, and at the fortieth trial, on the third day, she mastered the three movements, drawing the bolt, opening the lid, and holding it open. What do you think as to the speed of the learning?

11. I have come across the following in my notes, relative to the method I used in teaching my son his first Latin from a book (he had had a little conversational Latin). "The first time over, I translate, going slowly and giving him a chance to chime in a word or phrase here and there. The second time, he chimes in more. I keep heading off his errors, both those which he has made before and those which experience tells me all pupils are likely to make. Finally, he goes through it alone."

Show that this is an application of the tandem method.

12. Would the method described in No. 11 be a safe one to employ with an uninterested pupil? With an interested class? With an unready class? Why or why not?

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PART TWO

THE COMMON BRANCHES AS SYSTEMS OF BONDS

PART TWO

INTRODUCTION

How Much Time Shall Be Given to Each Branch?

What is the relative importance of the different branches in the several grades? What part of the total school time shall be given to each? Of course there is no one authoritative answer to this question; and further, the needs of the children vary according to locality and other conditions. However, it is instructive to view the average time distribution by subjects and grades in fifty representative cities of the United States as shown in the table below.[1]

Distribution of Time by Subjects and by Grades in Fifty Cities

Minutes per Week Devoted to	Grade							
	I	II	III	IV	V	VI	VII	VIII
Opening exercises	59	59	59	54	49	48	48	48
Reading	412	364	291	237	195	181	151	150
Language	116	122	145	164	179	182	207	220
Spelling	83	102	113	103	94	90	81	79
Penmanship	77	93	81	82	77	73	60	57
Arithmetic	93	149	203	231	223	226	217	220
Geography	25	11	77	128	157	166	151	118
History	42	48	54	88	103	110	141	181
Science	57	63	62	57	53	62	70	88
Drawing	151	84	87	82	77	77	77	76
Music	70	130	73	74	70	70	70	76
Manual training	65	73	62	70	77	88	112	115
Physical training	71	63	62	62	59	62	59	60
Recess	135	128	128	119	113	108	102	102
Miscellaneous	118	98	135	119	122	122	102	135

[1] From *The Classroom Teacher*, by Strayer and Engelhardt, Copyright. By special arrangement with American Book Company, publishers. Based on an investigation by Henry W. Holmes and others, the report of which appears in *The Fourteenth Yearbook of the National Society for the Study of Education*, page 21.

Below is an explanation of the headings as they appear in the above table. The investigators state that they "do not recommend these headings," but use them because they find them convenient.

1. Opening exercises, including allotments in ethics, etc.
2. Reading, including phonics, literature, dramatics, story-telling, memorization of poems, etc.
3. Language, including composition, grammar, punctuation, pronunciation, word-study, etc.
4. Spelling.
5. Penmanship.
6. Arithmetic, including algebra, geometry, business arithmetic.
7. Geography, including physical and commercial geography.
8. History, including civics.
9. Science, including nature-study, elementary science, physiology, and hygiene.
10. Drawing, including picture-study, art, etc.
11. Manual training, including industrial training, handwork, etc.
12. Physical training, including athletics, gymnastics, folk-dancing.
13. Recess.
14. Miscellaneous, including unassigned time, study.

CHAPTER VII

Some Simple School Habits

A superintendent, wishing to secure an efficient disciplinarian, visited at the opening of a term a school with many new pupils. A class was called, and the pupils rose carelessly. They were promptly seated, and then, by a motion of the hand, were called again. The second rising was not quite satisfactory, and they were again seated. At the next silent signal the pupils all rose properly, and this was recognized by a pleasant "I thank you; that pleases me." This exhibition of quiet power satisfied the superintendent, and the teacher was invited to take a better position. "Ten words of praise to one of censure," is a good maxim in an elementary school. Right habits are the result of training, not of talking, and the habit of quiet self-control is no exception.[1] — Emerson E. White

Exercises. — 1. A superintendent observed that a certain school, at time of dismissal, became very disorderly and boisterous. Pupils ran against each other in their efforts to empty individual waste paper bags into a large basket, the basket overflowed its contents onto the floor, and there was much noise and confusion. Apply the outline worked out in the last chapter and show how you would remedy such a condition by forming appropriate bonds.

2. Recall times in your elementary school days when you were very orderly in your school habits, and other times (if there were any) when you were other than orderly. Describe one or more notable situations. What did your teacher do that caused or prevented such situations? Again apply the outline (referred to above) and either justify what your teacher did, or show what you would have done had you been teacher, — that is, what you think should have been done.

Conduct. — The most common branch of all, the one the pupil will practice most in after life, is *Conduct.* Further,

[1] From *School Management*, Copyright. By special arrangement with American Book Company, Publishers.

the teacher, whether he realizes it or not, is teaching this subject, well or poorly, all the time. Other branches have but a period a day, but lessons in conduct are being taught and learned every hour of every day. Because the pupil does not carry home a book in the subject, nor recite lessons in it, both he and the teacher are, as a rule, in danger of forgetting its importance, and even its existence. Strangely enough, too, although we know that our pupils are below us in their achievement in other branches, and we consequently excuse their blunders and never leave the little ones especially, to learn by themselves, yet we often assume children to be our equals in the fine art of conduct. We become irritated when they do wrong (as if some adult had done us an injustice); and because we feel that they should "know enough to behave," we leave them alone to blunder along without guidance in this, the hardest branch of all.

Because this subject is so large, it is usually treated in a book devoted to it alone. We cannot, of course, cover it completely here but we can apply what we have learned in regard to the teaching of bonds that are easiest to learn, that occur most frequently in school practice, and that prepare the way for the greatest number of bonds-to-be. Because the neglect of these fundamentals makes the teacher much trouble, they are the very things which, until her school is well organized, should occupy most of her attention.

Entering the schoolroom. — Let us suppose conditions are such that our pupils can come rather directly into the schoolroom, tracking in a heavy weight of mud. What bond do we want to build? The "situation" is "entering the schoolroom," and the desired response is "cleaning shoes," or "removing overshoes." Very likely there are some "re-

lated responses" practiced at home. As the bond is a simple sensori-motor one, there is little danger of introducing more than one difficulty at a time.

Readiness suggests one of the chief questions: how can we start the nerve currents that will make our pupils want to come in with clean shoes? We might talk to them at the close of our morning exercises, when their nerve cells are fresh and receptive. (If we do it at the close of school, their impulses will all be for going out of the door instead of coming in, and they will not listen so well.) One of the first things that occurs to me is a placard which I saw in a business office a few days ago: "*If you track in mud at home, do it here. We want you to feel at home.*" "Now," we might go on, "this schoolroom is our home for five days a week, and we want everyone to feel at home. Surely no one of us would track in mud at home, etc." Other points, such as the appearance of a dirty room, what we think of people who live in dirt, and how our room compares with others, may also be brought out kindly and forcefully, but not to a length that makes them wearisome.

Exercise of the bond can also be provided for at the same time. Little guidance is required, though small children may need help. The chief thing is to see that no exceptions occur. "We must all help each other to remember about this. To-morrow morning, I am going to stand at the door when you come. First, I shall look into your face and smile 'Good morning' at you, and then look down at your feet, not to see whether you wear fancy shoes — that doesn't matter — but to see whether they are free from mud. If they are clean, I shall let you come right in; but if not — " (a shake of the head). "If you see me tracking in mud, you must tell me (tandem method) and I

will go back and clean my shoes. You must do the same. How many are ready to help keep our schoolroom free from mud?" If we call for a show of hands, very likely every pupil will have at least one hand up.

If there is danger of a last minute rush, we can provide a preliminary signal, such as a warning bell, which says, "Clean your shoes."

We take our stand at the door next morning and prevent all exceptions. Soon, a pupil whose personality is strong enough to make him respected, may be elected or appointed to take our place; and later, the place may be left vacant.

Effect of an agreeable kind can be produced by praise (if it is deserved); by calling attention to the clean floor and the feeling of cleanliness we all have; by comparing the room with dirty rooms (not mentioned by name or number) which we may have visited somewhere; by quoting the approving remarks of a respected janitor; and by noting that when we march, we do not, like a caravan going through a desert, raise a cloud of dust.

If our pupils again get careless, we can make the effect unpleasant by having a little inspection, each taking a peep under his own seat. The discovery of dirt will produce embarrassment. "Now, when soldiers are in barracks, each one has to 'police up,' that is, keeps things clean and tidy around his own bunk and his part of the floor. If the floor gets dirty under your desk, you must be a good soldier and clean it." Perhaps the next inspection still reveals one or two dirty spots. "I shall have to ask Frank and James to stay and do police duty under their desks. All the rest may go."

Tests of any special or standardized kind are hardly necessary. The coming of visitors, including parents and principal

or superintendent, will serve as test occasions. Where several rooms are near together, an inspector may visit them all and then make special mention of the most deserving, perhaps awarding a banner.

Teaching "attention." — I once asked an experienced and expert teacher what simple habits she found it most necessary to teach at the opening of a term of school so as to prevent trouble later.

Her reply was, "I found it most necessary to teach my pupils to pay attention to me, so that whenever I spoke to them or gave directions, they heeded immediately."

This surprised me; but I recalled that the first thing a recruit learns when he enters the army is to stand at "Attention," and that Major Koehler, a West Point expert, had spent an hour simply teaching a company how to stand up and salute. Further, whenever an officer comes near a group of unengaged privates, one of them always shouts "Attention!" and they all come to the proper position with a snap. Probably the army carries this kind of thing a little too far, and probably the school does not carry it quite far enough. The *attention bond* (if we may call it that) is a trunk line bond: no matter what the soldier or the pupil is to do or to learn, attention is the first step.

We shall not ask and answer in detail all the questions of our outline (page 113). In general, the stimulus will be, *Teacher in a position of expectancy, or giving a signal for attention,* and the response we want is *Pupil attentive both in mind and attitude.* Only in most unusual cases shall we permit any exceptions.

Let us suppose "school is called," and we step before our class. Our "personality," that is, what is suggested in the minds of our pupils by our appearance, is of great importance

now. The hounding and hunting instinct is strong in children: if they feel that we are weak and contemptible, a kind of legitimate prey, *and if we act so*, we shall hardly command their attention. We must act the part of the self-reliant, earnest teacher, anxious to get the work under way. "I'm the man you want to keep your eye on," said a Boston traffic policeman to me as I tried to pilot my wife across the street through a maze of automobiles. We should give our pupils the same feeling with regard to ourselves. The leading-and-following instinct is also strong in children; if we lead off well, they will follow.

If any are inattentive, we wait a bit, perhaps, as a good speaker does for an audience. But this may not be sufficient: "I see one or two who are not yet paying attention. I hope I shall not have to point them out." We may have to, however. But we shall not begin so long as there is a single arm lopped over the back neighbor's desk, or a single foot stuck out across the aisle. That teacher is fortunate who "just can't go on" so long as there is a pupil out of order.

Or suppose we are teaching a class. Of course we shall try to secure Readiness by making the work interesting, and we shall see that there is something going on for everyone during every minute of the period. But one is wandering. Permit no exceptions. *Catch the first stray sheep.* We may speak the pupil's name, more or less incidentally: "So you see, John, etc." Or we may ask him the next question. Or, "John will not know this to-morrow, for he is not paying attention now." Or, "Mary, aren't you feeling well to-day? You don't seem to follow the lesson," — and sometimes Mary *isn't* well.

If the class is generally inattentive, we change our procedure. We stand, if we have been sitting, make a few

gestures, perhaps, and act rather brisk. (You know how you feel when the quick clerk has your package done up before you can get out your purse to pay for it.) Perhaps we shorten the lesson period for the day. Or we may stop oral work and give a few questions on paper, to be answered then or later. The teacher who is apt in expression work (language and drawing) can usually help herself at such times by introducing a story or a blackboard drawing that bears on the lesson. But attention we must have.

> Children, left to themselves in work, are restless, noisy, rude, ineffective in many ways. They waste their own time and that of others. They know this as well as anyone, and an undisciplined school scorns the teacher who permits misbehavior and knows it is having a good time at the expense of valuable things.[1]

We shall always remember that love is the greatest thing in the world, but we shall also remember that it is not the only thing in school-teaching. The teacher who feels that she must govern wholly by the method of smiles will almost certainly have some insurrections that smiles will not put down. The race has struggled up to civilization through blood and tears, and most children still have to shed a few teardrops, if no blood drops, while they are catching up.

Desk keeping. — If you have taught school, you have noticed that "it never rains but it pours." Somebody's books slide out of the desk; a pencil box drops and its contents roll to all points of the compass; a pupil reaches frantically for his property, bumps his head on a desk and sets off irrepressible, inextinguishable laughter. We can prevent much of this by training in that part of good housekeeping which may well be called desk keeping.

[1] Lillian I. Lincoln — *Everyday Pedagogy*, p. 282.

Guidance is perhaps the first essential, for many pupils do not know how to keep things from tumbling out, having no plan for keeping them in order. If any neat, bright pupil can give a demonstration, he may bring his books to a table in front and explain. "I put my large tablet and my big geography on the bottom; and on top of them two piles of smaller books, with their ends toward me, so. On my right, I place in order all the books that I use in the forenoon, and on my left, the afternoon books. When I put a book in, I lay it right on top of the pile; when I pull one out, I always draw it from the bottom, taking care not to pull any other book out with it. My pencil box slips in endwise here at the right. My waste paper I keep at the left; but I throw it out each day when the waste basket is passed. If anything happens to get my desk out of order, I always put it right before I leave at night."

If this is followed by a fair amount of "exercise" in arranging desks, pulling out and replacing books, if there is a nightly inspection for a time, and if the dropping of things from desks is met by a "how-came-that" look from the teacher, the good desk keeping of the school should soon win the pleasant approval of praise.

The forming and passing of lines. — Years ago, when I was a cadet teacher in a normal training school, I had my class of fifth-graders lined up in the hall, ready to pass, when the critic teacher scanned the row of pupils and said firmly, "Earl B., leave the line." It dawned upon me that my teaching coach had a higher standard and a better eye than I had. Since then, I have seen many teachers line up many pupils, and I have seen my old fault reappear many times. It is surprising to find how many teachers fail to remove the noisy, stamping, swaying, pushing pupil from the line.

Few of us, I am afraid, love our pupils enough to punish them properly.

Not that such an offense needs a crushing punishment. Here, as in so many other cases, it is certainty rather than severity that counts. *Readiness* of course we shall seek to create, largely by an appeal to instincts, pitting our room against some other or one row against another, dismissing first that line which is ready first or which persents the best appearance. We shall praise those who march "like soldiers." We shall try, too, to make it unpopular to disturb a line that is forming or passing, and to create a wholesome social atmosphere by an appeal to the herd instinct, and perhaps an appeal to reason on top of that.

But the essential item of our outline to apply here is the prevention of exceptions. Horses and schools must not run away if we can help it. Something must happen to the wandering sheep. For exceptional conduct there must always be an exceptional effect

CLASS EXERCISE

Formulate a plan for getting each pupil in your school to use but one hook, and always the same hook, in the cloak room (supposing you do not have lockers). If your cloak room is an old-fashioned one, with but a single narrow door, how would you plan to get the wraps, umbrellas, overshoes, etc. (assumed to be in the cloak room) into the possession of their respective owners at time of dismissal? Consider the advantages and disadvantages of (1) having monitors to deliver wraps to pupils; (2) permitting one row of pupils at a time to get their own wraps. If the cloak room had two doors, how would you manage? So far as simplicity in school management is concerned, what is the ideal way to stow wraps?

FOR FURTHER STUDY

1. Tell how you would teach a pet cat to jump over a stick or over your joined hands.

2. State your plan for training pupils to stand promptly and in order on signal.

3. What do heat, light, and ventilation have to do with the general readiness or unreadiness of pupils?

4. Assume that your pupils are to pass to the front of the room or elsewhere to recite, and tell how you would train them to do it.

5. Apply the outline on page 113 to show what can be done to keep pupils in good posture, whether standing or sitting.

6. Do you favor leaving pens and other writing materials in the possession of the pupils all the time, or distributing and collecting them at each lesson? Why? Does your answer vary with the age of the pupils?

7. Tell how you would train monitors to distribute and collect materials, pass waste baskets, etc.

8. What plan would you adopt in the first grade for keeping pencils sharp? In the fifth grade? How would you give pupils the necessary training to carry out your plan?

9. What is the best method you know of for permitting pupils to get drinks, leave the room, etc., so as to satisfy all reasonable wants and yet permit no abuses? How would you put your method into operation?

10. List all the things you would do to insure clean blackboards, to see that crayon is kept in place, and that neat written work is done at the board.

11. Tell, in terms of Readiness, Exercise, and Effect, how you would make a fire drill effective.

12. There is no doubt that many children, both at home and at school, are thought to be disobedient, when the real trouble is a lack of attention while the request or command is being given. How can this be remedied?

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CHAPTER VIII

Primary Construction Work

Exercise. — Recall all the cases you can of children who were left-handed. What do you think caused them to be left-handed? Do you know, certainly, of any such child who suffered no difficulty or delay in learning to talk? Did any change and become right-handers? If so, what caused the change? Also, was there any difficulty experienced, especially in the way of speech or nervous control? Do you think the right hand ever becomes as proficient, in such cases, as the left hand would if a change were not made?

In order to introduce but one difficulty at a time, let us study next a group of bonds which are easy to form, which occur very frequently, and which prepare the way for a great number of other bonds-to-be. They are sensori-motor connections for the most part, and their relation to each other is usually simple. Such a group of bonds is found in Construction Work, and especially in the beginnings of it, which we shall now consider.

Right-handed and left-handed pupils. — As soon as a child begins to use his hands, we must consider the matter of handedness. Parents ought to be the first to deal with it; but the children usually bring the problem to school with them. Quite commonly, the teacher never thinks of it seriously until the child picks up his pen. Yet for years before that day one side of his body has been getting the start of the other in all sorts of performances. For the question seems to be one of "sidedness" rather than handed-

ness alone: the child is likely to "walk left-handed" (or right-handed), and in general, to use one whole side of his body in preference to the other.

There is little doubt (in my mind, at least) that children are born more or less right- or left-handed. Probably three or four per cent are born strongly left-handed, three or four per cent ambidextrous (equally ready with either hand), and the rest right-handed. The left-hander is sometimes neglected in school, sometimes caused to suffer through a forced change to a hand that will serve him less efficiently. (Imagine yourself compelled to change to your other hand.) Handedness seems to be even more pronounced in childhood than in adult life.

It would be well if we had some way to determine in each case which hand nature intended to be major and which minor, since she evidently has her mind made up about it for most children. Some have sought to find this out by measuring the bones and muscles of the arms of babies or primary children, on the theory that nature would make larger, from the beginning, the limb designed to be dominant. Strength of grip in the two hands has also been used as such an indicator. Better than either of these is the test of tapping with the fingers (not from the wrist or with the whole arm), and a tracing test whose movements are much like those used in writing.[1]

To shift or not to shift. — If a child is born ambidextrous, it is safe to advise that he use his right hand wherever, as in writing, one hand must play a leading part. But if he is born a left-hander, such advice is not safe. Not only will his right hand never become so proficient as his left can be, but there appears to be some danger of inducing

[1] Arthur L. Beeley — *An Experimental Study in Left-Handedness.*

nervousness and of interfering with the development of his speech.

Most people are right-handed and left-brained. That is, the left half of the brain, which controls the right side of the body, is larger and heavier than the right half. Also, there is a speech center [1] which is generally found on one side only of the brain, and that side is opposite the dominant hand.[2] If we may make the reasonable assumption that the deft activity of the dominant hand is the best stimulus for the proper development of the speech center, then we can readily see that to compel a pupil to shift hands is probably to compel him, not only to shift his hand-control from one side of his brain to the other, but also to shift his speech center along with it. Hence the nervousness and speech trouble that are reported in some such instances. Nature never meant the child to be such a shifter.

The sensible thing for us teachers to do is to make the right-hand bonds the stronger if we can do it with moderate effort; but if a pupil shows himself dominantly left-handed, and especially if nervousness or stuttering results when he attempts to use his right hand, then we should let him "get his hand in" the way he wants to. And further, we must stop regarding left-handedness as a disgrace or a life burden. The pure left-hander is just as skillful as the pure right-hander. Let us show the good sense of the baseball coaches, among whom the "south paw" is very welcome.

[1] Certain psychologists seem to have almost a phobia for the use of the word "center" in this way. In geography, we can speak of a railroad center or a commercial center without implying that no railroading or commerce goes on elsewhere, or that nothing but railroading and commerce go on in these centers. The term "speech center" does not imply that no other part of the brain has anything to do with speech, or that speech control is the sole business of this center.

[2] See C. Judson Herrick's *An Introduction to Neurology*, Chapter XX.

What bonds shall we build in primary handwork? — You remember that the ignorant man who borrowed his friend's dictionary, thinking it was a novel, returned it with the remark, "There are many fine stories in it, but they somehow seem short and disconnected." There are many fine experiences in primary handwork, and they are fortunately short and disconnected enough so that we can connect them with other subjects in a way most delightful.

It is a spontaneous, expressive subject: that is, the blithe spirit of the child expresses itself through his two hands as the lark pours his full heart through his throat, "in profuse strains of unpremeditated art." His is the free purpose, and no matter what it is, it will serve our purpose; for what we want, foremost and chiefly, is to set his sensori-motor bonds into action, to get sense organ and brain and muscle to work together, and especially to teach him to manipulate, to coördinate, to become handy with his hands.

As the work does not demand long-drawn-out drill, we can make it a series of happy projects without much danger of introducing more than one difficulty at a time. And as it has no necessary order of its own, it can be a good servant of all seasons and subjects. We can carve paper turkeys at Thanksgiving, make candy boxes at Christmas, cherry trees and hatchets and valentines in February, and a circus in May. Play can be forwarded by making badges, doll cradles and hammocks, bean bags, game boards, driving reins, pin wheels, toy money, "things" to "keep house" with or to sell from the toy store — and it is no small educational service to enable a child to play happily. Other branches profit when we cut out paper animals and vegetables in nature study, or letters to help teach alphabet and

vocabulary, or when we call arithmetic to our aid in counting and measuring and laying out materials. Valuable language bonds are formed by naming materials and processes, and by following directions accurately. The home profits when we construct a calendar, a pin-holder, a pen wiper, a match-strike, a mat. Through it all, of course, is developed taste in such work and appreciation for it, a readiness for the manual and industrial arts which are to follow. The use of such a myriad of sensori-motor bonds rouses the high-level centers: the child learns to "think in the concrete," to judge in advance what can and cannot be done with the strong-willed stuff found in the stubborn world outside of us.

The most common materials. Since the range of our work is almost unlimited, much will depend on the materials we can lay hands on in our neighborhood, and with the means furnished us. In the country, one can pick up many a treasure — straw, corn husks and cobs, acorns, pithy alders, birch bark, pine cones and needles, and other natural wealth, not elsewhere easily found. The country teacher should take pride in all this; and feel gratulation, rather than humiliation, because her work is different from that of the city.

Merely to name the materials most commonly used will suggest a great deal that can be done with them. They are paper of various colors, cardboard, shoe pegs, beads, clay, sand, toothpicks, cord, yarn, spools, raffia, splints or willows, straw, leaves, and natural objects like potatoes and peanuts. Blue print paper and carbon paper come in handy, and old cigar boxes or chalk boxes, with brads and glue, can be made to serve, as in building airplanes and automobiles.

What related responses has the learner made already? — There are few parents who do not know at least a few tricks of construction, and it is to be hoped that there are few who do not enjoy teaching these to their children.[1] Luckily, too, children have such a strong constructive instinct that they often tear their toys to pieces to find out how they are made, and then put them together again — or try to. Further, the girl has probably made mud pies and cut out paper dolls. The boy has made — something or other, even if only a "kite" formed by tying a newspaper to a string. Quite possibly he has an album at home, perhaps made of wrapping paper, in which he has pasted pictures of his heroes and heroines.

The kindergarten child is of course an "old hand" at construction work.

Introducing one difficulty at a time. — As before said, the bonds are mostly sensori-motor, and usually in simple relation. Some, however, lie in series or trunk line, and so form a "sequence" which the teacher must respect. For instance, teachers often dread the use of the ruler for measuring purposes during the first year; for the edge of it is so etched with small marks that children are badly confused by it. But begin with a ruler that has only the inch marks, and the game is easy. If such rulers are not furnished, it may be a good exercise to get thin wood, or

[1] If my first teachers had asked me what I had made with my hands, they would have found that, either alone or with older help, I had made a "cart" out of a spool and a stick; a "flapper" consisting of a spool and a piece of paper so stuck on that it would flap when I forced my breath in and out; a button buzzer; a rattle from the dried windpipe of a chicken, with shot inside; a football from a pig's bladder; a jumping-jack from the breast bone of a fowl; a potato popgun; strings of popcorn and wreaths of leaves; elderberry ink; whistles; slingshots; catapults; squawkers; and many other things.

even stiff cardboard, and make them. The half-inch mark can be added in connection with the teaching of *one-half*.

Pasting, since it appears, with variations, in so many constructions, may be regarded as a trunk line bond. Accordingly, it should have its own special exercise, which will be, in the teacher's mind, a pasting drill, and in the mind of the pupil, a pretty little project in welding together strips of paper of various colors, perhaps left flat at first. In a later exercise these strips may be curled into links, the links interlocking to form a chain.

The thoughtful teacher will usually have no difficulty in discovering which bonds must be fixed first in order to prepare the way for other bonds-to-be.

Readiness. — It would be much harder to prevent readiness than it is to induce it. If in a child's whole brain there are any cells that are always ready to work, they are the ones that control his muscles. Watch him roll, squirm, twist his body, and juggle, joggle, adjust together the things around him. The sap of life may not reach up to his arithmetic cells for years yet, but *manipulation cells* are early flooded with energy.

When fuzzy and colored stockings are worn, children often pick off the fuzz and make bookmarks of it. They catch tricks from each other. He who can knit through a spool, or make a paper boat or cap or bird, or even interlace the papers from chewing gum into some new pattern, is a leader who quickly gathers followers and imitators. The ever-ready bonds of a number of instincts here unite their forces.

Further, there is a seasonal readiness. The golden haze of autumn days, the glorious woods, and ripening gardens, put everyone in the mood for cutting out and drawing and

coloring such characters as "Billy Beet," and "Tommy Tomato," and all their many relatives. And think of Thanksgiving, and Christmas, and all the other dear days!

Despite this readiness, let us not go at our exercises mechanically, merely passing out materials and giving set directions. Let us talk over our purpose, give the children a choice if we can, and indulge in visions of what we can do with the thing when it is done — where we can hang the paper chain, how we shall march with our soldier caps, to whom we shall send the Christmas card.

And if you would have yourself and your class both ready, Teacher, make a specimen in advance, and bring it before their eager eyes.

Exercise. — Rarely do "free expression" and "drill" meet and combine so happily as in handwork. Since there is always some kind of material in hand and something interesting is always being done with it, and since the fundamental acts of skill, such as tearing and measuring and scissoring and pasting, recur again and again in new situations, the child need never feel any of the boredom of drill.

Guidance is easy to give. Most of the results expected are not minutely accurate, especially at first, and time can be taken for coarse bonds to become refined without hurrying the process. External guidance may be necessary in teaching such acts as the holding of scissors — placing the thumb and the correct finger through the handle holes and starting the movement properly. Mass cutting should precede cutting to line, for the mass of the object being cut out is a better guide than a single line. Quite usually, guidance can be given by imitation, the teacher performing the exercise before the class and supervising the pupils as they follow, step by step. After they have learned to read writing, or as

an exercise in silent reading (if it does not introduce more than one difficulty at a time), directions for an exercise may be placed on the blackboard.

Things to do and make.[1] — Of course it is not our purpose to lay down a complete course of exercises, but suggestions may help to start the work. One of the first and easiest things to do is to cut out pictures, as of fruit and vegetables, from catalogs and magazines. This may be followed by cutting out objects from blank paper; first with a sample in view, and then from memory. Other interesting and rather easy projects are the making of an envelope (perhaps to hold cuttings or other work), a simple bookmark, a box, a cut-up puzzle, a calendar, a simple booklet for pictures or stories, paper chains, badges of colored paper, soldier caps, pin wheels, Christmas and Easter cards, valentines, leaf chains, simple mats, and picture frames. These are followed by weaving, braiding, the making of coarse stitches of various kinds, and the beginnings of woodwork and mechanical drawing.

An abundance of materials, such as plasticene and raffia, will make possible an abundance of other projects and processes.

The group project, too, must be mentioned. If each pupil cuts out a tree, the united product will form a forest, the smaller and darker trees going into the background. A farmyard can be planned by having each child cut out one of the animals; a house can be furnished if each one will contribute a piece of (paper) furniture; or a whole village erected by letting every pupil "build" the kind of house he

[1] One of the best books for the primary teacher is *Construction Work for the Primary Grades*, written by Edward F. Worst and published by the Bruce Publishing Company, Milwaukee, Wisconsin. Several of the suggestions here given are taken from this book. Another excellent book is *Purposeful Handwork* by Jane W. McKee, published by The Macmillan Company.

would like to live in. Of course the children should know, from the beginning, the nature of their group project, and plan and work accordingly.

The teacher's self-starting equipment. — Not until taxpayers love their children more will teachers have all the material they need to work with. But homemade apparatus and a few cheap supplies will often help out wonderfully.

To make subjects for mass cutting, one can use a potato or turnip. Cut it so as to form a large, flat surface, and onto this surface stick the paper form (perhaps that of a leaf which you wish to duplicate. With knife held perpendicular to the flat surface, cut round the edge of the pattern, perhaps a quarter of an inch deep. Next, cut away, to the same depth, all that portion of the potato or turnip which lies outside the pattern, leaving the latter standing up in relief. Remove the paper pattern and you are ready to print. If a pad is needed, you can make one by wetting with ink a few thicknesses of cloth. Print on drawing paper as many copies of your pattern as your school needs for cutting-out purposes.

To duplicate, in the form of a line drawing, any picture you may wish to have, place a sheet of carbon paper, carbon side down, on a sheet of glazed paper of good quality, and on top of the carbon paper the picture you desire to duplicate. Trace with a pencil all the lines you want to reproduce. Remove the carbon paper, and trace on the glazed paper, with hektograph ink, the picture which has been transferred to it. With the aid of the hektograph, draw off as many copies as are needed. [1]

[1] To make a hektograph, cook slowly together for two hours, as you would cook oatmeal, two ounces of sheet gelatine and one pint of glycerine. Pour this into a pan 9 by 12 inches and allow it to cool for several hours.

The matter to be duplicated should be written or drawn with hektograph ink on fairly heavy glazed paper. After the ink has dried well, place the paper,

Simple designs for ornamental stamping purposes can be cut on the end of a cork, a rubber eraser, or on sticks that have cross sections of various shapes.

It is very desirable that a paper cutter (photograph trimmer) be available, and an eyelet punch, with eyelets, helps greatly in making neat cards, booklets, etc.

How handwork can help form bonds in reading. — When children are learning to recognize words, pictures are very helpful as keys to these words. Such pictures as those shown

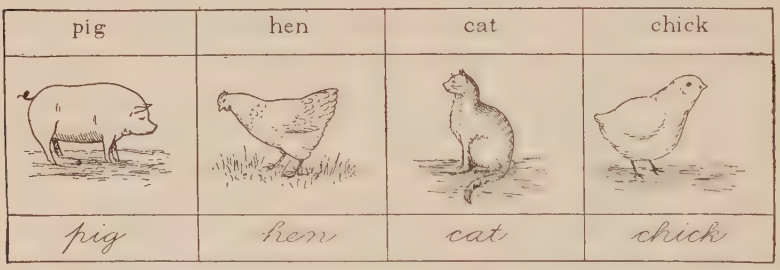

Fig. 19. Illustrating handwork as an aid to reading. (From Edward F. Worst's *Construction Work for the Primary Grades*, page 52.)

in Figure 19 can be purchased from a supply house or made with the hektograph. The children may cut them apart, the words at first being left attached to the pictures. Later, the "game" is played by matching word and picture.

When various groups of words are being built up, such as the *-at* family or the *-ight* family, these family names

ink-side down, on the hektograph, and smooth it carefully with fingers or cloth. After a minute or so, remove it, and the matter to be duplicated will be found on the surface of the hektograph. Next, apply sheet after sheet of unglazed paper to the hektograph, pressing each down gently. The first ones should be removed after short contact, the later ones allowed to remain a little longer.

When through using the hektograph, wash it off with sponge and lukewarm water.

and all the consonants that are to be placed with them can be presented on sheets, clipped apart, and then appropriately combined.

The alphabet must be learned. In connection with reading, or spelling, or both, small letters and capitals may be presented in large, hektographed form and then cut out. It is also well for each child to make his own first little dictionary, that he may better understand and appreciate the large one. A booklet may be made for this purpose, and the words entered under the appropriate letters of the alphabet.

How handwork may help to form bonds in other branches. — Picture number cards may be made or bought in sheets, showing one candle, two apples, three birds, and so on, with the corresponding figures, which are later to be cut loose and matched with the right pictures. Separate cards may be made holding (*a*) a domino face showing four spots, (*b*) four simple strokes, (*c*) the figure 4, (*d*) the Roman numerals for *four*, and the word "four." These are to be cut apart and then re-grouped. Other numbers will of course be treated similarly, the cards being abstracted from among others with which, as time goes on, they are mixed more and more numerously. There will, of course, be many occasions for counting and measuring.

In connection with history stories, we may cut out or build Indian tents, or weave a primitive mat. For language, we may make a story book, pasting in the illustrations. Geography takes us to the sand pile, if we are lucky enough to have one. We may even cut out musical notes and pin or paste them into a tune on a large staff. As for drawing, that is the very twin of construction work.

Effect. — If our pupils undertake only that for which they are reasonably ready, *Effect* will usually take care of itself,

for it will be happy and inviting. Never was a child, though (nor an artist, either), whose brain did not run ahead of his hand. Imagination promises more than the hand can perform. It would be unfortunate if this were not so. If we are still in the growing stage, dissatisfaction with our petty performances will lead to something larger.

CLASS EXERCISE

Let each one (or a selected number) demonstrate to the class some piece of cutting, weaving, folding, molding, or other bit of construction work which, it is expected, will prove interesting and perhaps useful in future teaching.

If time permits, the demonstrator may apply the "Outline of a General Plan for the Forming of Any Set of Bonds," stating just what bonds he wants to build, what related responses he assumes the learner is able to make, etc.

FOR FURTHER STUDY

1. Can you think of any reason why we should wish all people to be right-handed? Left-handed? Ambidextrous?

2. If all children were left-handed, from which side ought the light to come in schoolrooms? Why?

3. What experience did you have in construction work before entering school?

4. Find cases in construction work where the bonds are related otherwise than simply, that is, in series or trunk line.

5. How are a baby's early movements related to his environment? That is, does he try to get "into touch" with it? And if not, what is he doing, so far as his development is concerned?

6. Give illustrations to show how a young child *manipulates* the objects of his environment before he tries to *construct* anything with them.

7. Under what conditions, and with what object, would you permit or encourage inventive, original work in construction?

8. "Time can be taken for coarse bonds to become refined without hurrying the process." Just how will this show itself in the child's work?

9. Show the value, from the standpoint of effect (and future readiness) of putting up samples of completed work in the schoolroom; of permitting them to be taken home, or played with. What instincts are appealed to by these means?

10. Give original examples to show how construction work can be made to serve other branches.

11. Suggest original group projects in construction work.

12. Show how construction work can be used to encourage historical appreciation, such as, for instance, an appreciation of the difficulties faced by a Pilgrim housekeeper.

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CHAPTER IX

Penmanship

Exercise. — *a.* Write the sentence, *the quick brown fox jumps over the lazy dog,* at natural speed, only taking pains to pause (and poise for the next flight) a long time, perhaps a second, every time the pen reaches the top of a letter or a part of a letter, but never when it is at the bottom of such a unit. For example, pause at the top of the small *t*, at the top of the loop of the *h*, at the top of the lower part of the *h*, at the top of the *e*, and so on. Write the sentence more than once, observing in the latter writings (especially if you are a good penman) whether your pen varies its speed in different parts of its course, and especially whether it travels over a short stroke at the same rate as over a long one.

b. Write the same sentence as before, but this time make the long pause every time the pen reaches the bottom of a letter or part of a letter, and there only. Does this make any change in the general character and appearance of your writing? Any change in the forms of the letters?

c. Find the most natural pausing points, occurring wherever they may, that divide the words or letters into rhythmical units composed of strokes that can be executed most easily together. Can you discover any relation between these rhythmical units and the forward motion of the hand or pen? Do all people divide the same words into the same rhythmical units, or is there an individual variation?

State any conclusion you may reach with regard to this rhythmical factor in penmanship.

What is the ideal paper product? — Old writings, such as old letters and the signatures attached to the Declaration of Independence, show us that writing is not far different now from what it was over a hundred years ago.

Practical people write a practical hand, whether in the last century or in this. We tell our pupils they may be Presidents some day; and in penmanship, at least, we are educating many of them past the presidential stage. Great documents are seldom signed by those who stick to the copybook, clerk-and-bookkeeper style of writing, nor, on the other hand, by those whose signatures are illegible.

Writing is meant to be *read* — that much is clear; and if we are going to use it as a means of passing along ideas to our absent neighbor, he should be able to read it rapidly, somewhat as he does print. But if the reading were all, there would be no writing; for the print we read in such quantities becomes more legible to us than any script, and we should all print with the pen. No, reader and writer meet each other in a compromise, the writer saving time and energy as compared with one who prints, and the reader losing it. The time and energy of both could be saved by using shorthand, but this is not yet conventional.

It is sometimes said that script should not only be easily readable and readily writable, but should also be beautiful. But, in such matters as writing, the useful, serviceable, and familiar come to be beautiful and their opposites ugly. Here is a Japanese signature (Fig. 20) which may look fine

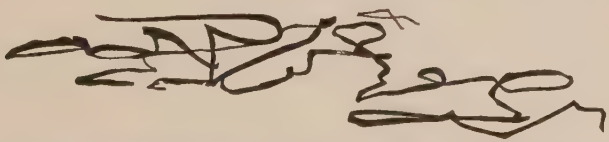

Fig. 20. A Japanese signature. (From Henry W. Ellsworth's *Illustrated Lectures and Lessons on Penmanship*, p. 270. The Ellsworth Company.)

to the friends of its owner, but probably would not be beautiful to any one of us unless he found it signed to a check

drawn in his favor. The Germans have kept, in much of their print, the old ornamented forms of the letters which the monks designed for use in making illuminated copies of the scriptures. But can any American studying the language say that the German letters have more beauty in his eye than those of the more practical English alphabet?

What bonds do we want to form? — The "situation" to which we want our pupil to respond is that of seeing, or hearing, or otherwise having in mind something that he wishes to write. The response is writing it legibly, easily, and speedily; and that means going through a very complex kind of movement; for the thirty bones and fifty muscles of the human writing machine, the hand and arm, must all be coördinated in a way most wonderful.

This movement, so far as its direction is concerned, is of two kinds, sometimes called (*a*) *progressive* and (*b*) *projective:* (*a*) the pen must skate smoothly from side to side across the paper, and (*b*) at the same time it must move up and down the page so as to form the letters as it goes.

In order to perform these movements, we should take good *position.* As taking position is simpler than writing, let us begin with that.

Gross position. — Marksmen are trained to shoot in various positions, — standing, squatting, and prone (lying flat). And if we would have our pupil practice as he will perform in actual life, he must write in various positions, standing with notebook in hand, squatting with tablet on knee, bending over his table in the laboratory, etc. He must be able to adapt himself, as the writer of shorthand does, to all such situations.

The standardized school position is shown in Figure 21. The writer sits hygienically, of course, in a well-adjusted

seat, feet on floor and spine and head erect, facing the desk [1] and leaning a little toward it, but with body not quite touching it. The arms rest lightly on the desk, elbows near the

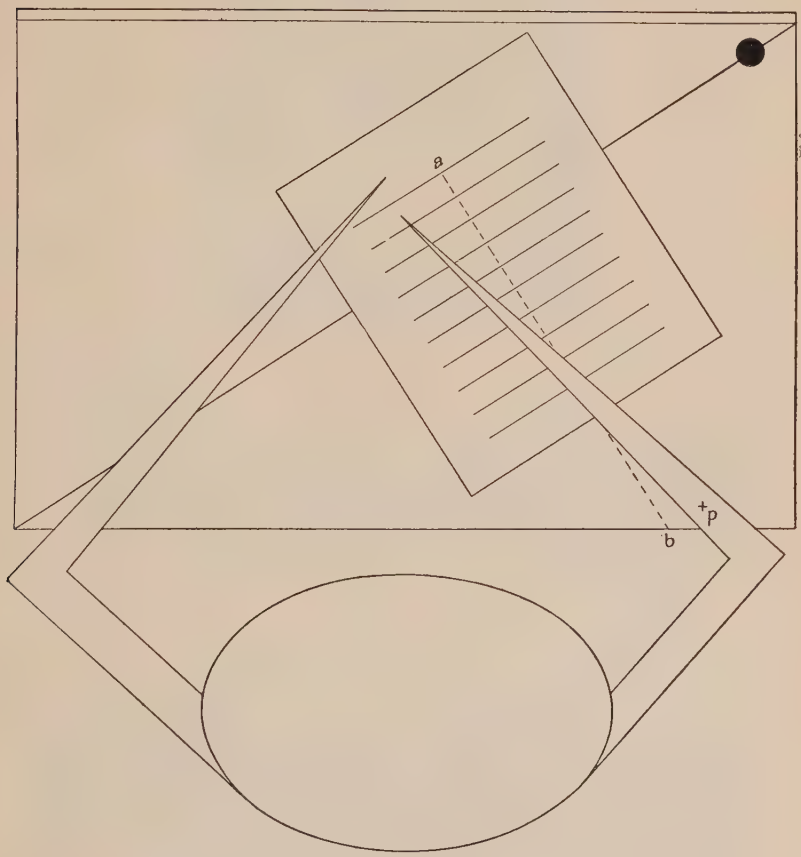

Fig. 21. Illustrating generally-accepted correct position. (Adapted from C. C. Lister's *The Muscular Movement Writing Manual.*)

[1] In some cases, as where the desk is very narrow from front to back, it may be necessary to turn somewhat to the left so as to have more room.

edge. The paper is placed at a convenient distance, a little to the right of the middle of the desk, and is held in place and shifted, from time to time as necessary, by the left hand. Its top and bottom edges make an angle of about 30 degrees with the farther and the nearer edges of the desk. Some teachers draw a line across the pupil's desk from the lower left to the upper right corner (as shown), and have the pupil place his paper so that its lines run the same as this guide line.

Position of writing arm and hand. — Most writers find it best to rest the right arm on the desk at a point a little to the right of a line drawn down through the middle of the paper, perpendicular to the line of writing (line *ab* in Figure 21). With this point (*p*) as a pivot, and with the paper turned at the angle described, it is easy for the hand to sweep across the paper and follow very nearly the line of writing. *This progressive, sweeping movement is the first essential in producing good writing, and is the first thing to be taught as soon as the pupil can take correct position.*

The essentials of hand position can be summed up under four heads: [1]

1. Pronation of hand. The hand and wrist should be rotated toward the left far enough so that a ruler, laid across the top of the wrist, will make with the desk under the wrist an angle of less than 45 degrees. The old test, that of keeping the wrist so flat that a penny will ride on it while the writing is going on, requires more pronation than is necessary.

2. Support of hand. The third and fourth fingers should carry the hand, serving as "runners" for it. The

[1] This summary follows Freeman in the main. See *The Handwriting Movement*, pp. 15, 16, and 164.

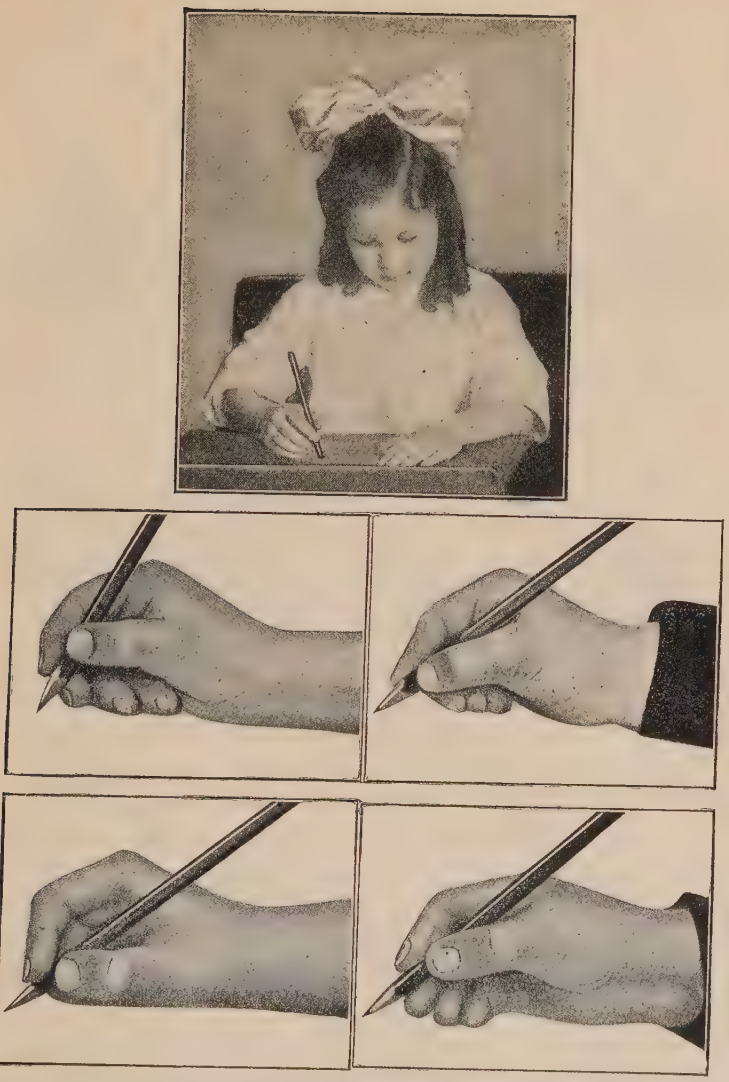

FIG. 22. Correct position of body, and permissible positions of the hand for young children. (Body position from C. P. Zaner's *Zaner Method;* Zaner and Bloser Company. Positions of hand from W. A. Whitehouse's *The Modern Writing Master;* Silver Burdett and Company. Grouping from L. N. Freeman's *Psychology of the Common Branches;* Houghton Mifflin Company.)

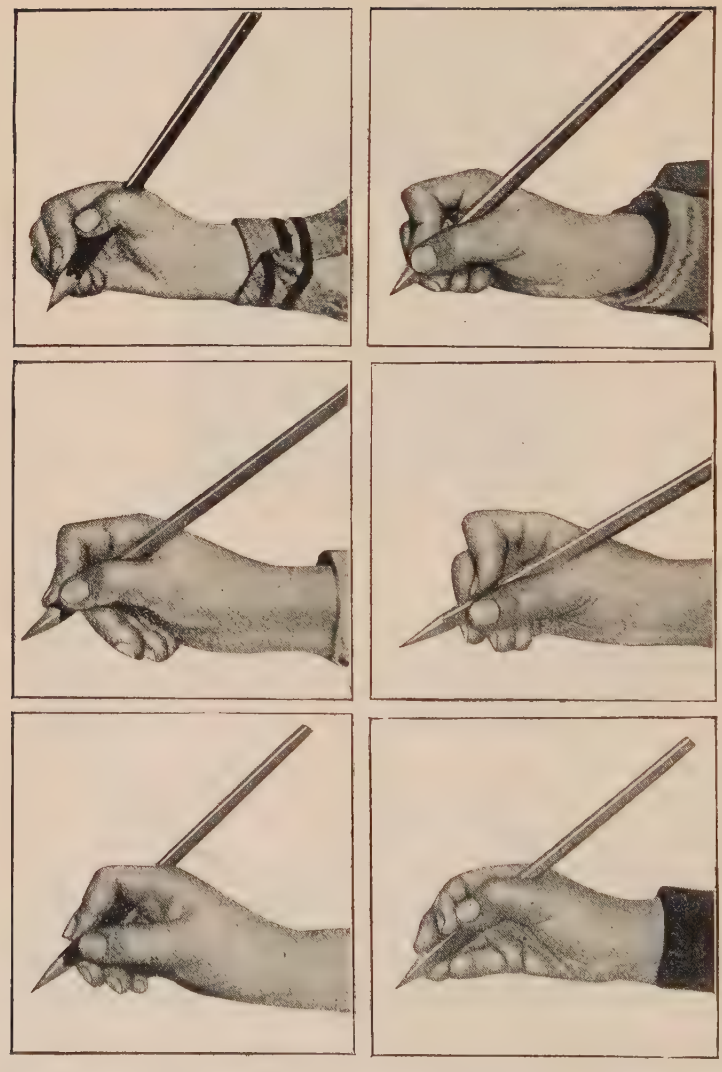

FIG. 23. Incorrect positions of the hand. (From *The Modern Writing Master* by W. A. Whitehouse; Silver Burdett and Company. Grouping from L. N. Freeman's *Psychology of the Common Branches;* Houghton Mifflin Company.)

expert often uses the nails of these fingers as a sliding rest. Pupils need not do this, nor need they be forbidden to let the wrist touch the paper, though it is desirable that it shall not. What is essential is that the hand shall not roll over to the right so far that contact with the paper causes the former to stick and "hitch" along instead of to glide and swing along.

3. Contact of writing fingers with pencil or pen. The writing "fingers" are the thumb, index, and middle fingers. The index finger must touch the pen or pencil at a point lower than where the thumb touches it, and must make, at its middle joint, an angle greater than a right angle. The middle finger naturally touches at a point still lower, and may approach quite near the writing point. Pencil or pen holder should of course slant upward between thumb and index finger, and not between index and middle fingers.

4. The grasp of the pencil or pen should always be loose.

Figure 22 shows various positions of the hand that are permissible for children, and Figure 23 some inefficient positions that ought not to be allowed.

Movement. — Three aspects of movement are important, (*a*) the progressive, or side-to-side movement already described, (*b*) the projective, or up-and-down movement by which letters are largely formed, and (*c*) rhythm, the variations in speed from point to point, the poise and flight of the pen by which the writing is broken up into units of execution. The latter two require further study.

(*b*) The big question here is whether to use finger movement chiefly in the forming of the letters, or arm movement, the latter being the result of rolling the arm on its pad of muscular support near the elbow. The answer is, Use both, permitting either to predominate according to age,

ease of execution, personal preference, etc. Freeman, who used the motion picture machine to make an unusually careful study of writing movement, found that all writers, good and poor, and whether trained in arm movement or not, use finger movement to some extent. The poor writers distinguished themselves by using other movements, such as those of hand and wrist, in addition to employing the fingers and the arm. These "other movements" should be discouraged. A certain amount of side swing of the hand at the wrist, however, to aid the progressive movement, is found by some to be an advantage.

Young children, many of whom cannot learn the arm movement even with training, should be allowed to form the letters with their fingers; but they must never be allowed to go hitching across the page as they do it. A smooth progressive movement is to be maintained from the beginning.

(*c*) Rhythm in good penmanship is much like the rhythm in reading good prose. We start, and halt, and swing on again, and then run rapidly all the way through a long and uninterrupted cadence. Pauses (whether indicated by punctuation marks or not) divide the matter into rhythmical units. Such units are not all of the same length, nor do all occupy the same time, nor do we read through them at a uniform rate of speed. But whereas a poor reader will have continual trouble with them, the skilled reader comes to feel that they are perfectly natural, and falls in with them without difficulty.

So in writing: we may start off briskly (as in forming the small letter *g*), stop and swing back round a small loop, pause again, and then glide rapidly down its long and graceful tail and quickly up again to the finish. Pauses divide

the matter into rhythmical units. Such units are not all of the same length, nor do all occupy the same time, and the speed of the pen is never uniform. Freeman found that the poor writer moves in a jerky and irregular way, either failing to divide his writing into rhythmical units or doing it very awkwardly. The skilled penman spends a larger portion of his time pausing and poising than does the unskilled, but glides along, when he does move, with wonderful smoothness and regularity.

Further, this difference in the execution of rhythmical units proves to be one of the sharpest dividing marks between poor and good writers, and extends its influence even to the changing of the shapes of letters. The indication is that rhythm (as here described) should be made an object of great attention in teaching.

What not to teach. — Because so many useless and even harmful things are said and done in the name of penmanship, it appears in place to point out a few bonds that need *not* be formed.

To begin with, we are not trying to make expert penmen at any point below the commercial courses in the high school. If experts develop in the lower grades, we shall regard them as a happy by-product of our larger purpose, which is to give each child fair control of a good plain hand that he can write at the rate of a letter a second. We do not try, in the elementary school, to develop our pupils into expert public speakers or fine mathematicians, but we do try to teach them to read and "figure" well enough to meet the common demands of everyday life. And further, although in the everyday life of the outside world the pen may be mightier than the sword, it looks as if we shall have less use for both of them as time goes on. Thorndike has

made the very sensible suggestion of promoting to the typewriter those pupils who habitually write a fair hand at a fair rate of speed (Quality 13 on his Writing Scale, written at 60 letters per minute). It is increasingly true that those pupils who in after life are to do much writing or recording, even bookkeeping, will do it with a machine.

This is a day of "minimum essentials" in all branches. To go on teaching expert penmanship to all pupils is a great educational waste.

In the second place, we shall not insist on any one size or style or slant of writing. In one's chirography there is a great deal of individuality when it is allowed to express itself.[1] Lines may be thick or thin, shaded or unshaded; letters may be tall or short, "bold" or "timid," round or otherwise. Extreme forward slant has proven most rapid; but vertical writing is most like print and so most legible, and can easily be produced, with the movement previously described, by pivoting the right arm a little farther out from the body. Even a back slant is not objectionable when written by some hands.

In the third place, we shall not insist on details of position beyond what is essential to good movement. The fingers may slide down near the writing point if their owner feels any better about it — provided he does not smear himself with ink. Some of the fastest and best shorthand writers grasp the writing instrument very close to the point — and they still use a certain amount of arm movement. Neither

[1] Galton found that even between twins who closely resemble each other, one difference usually remains — a difference in handwriting. He recommended that graphologists who attempt to read personal traits from handwriting, should follow up this fact. Expert graphologists do read "character" from undisguised handwriting, with some success, although psychologists are unable to explain how it is done.

need the penholder point toward the right ear, nor anywhere else in particular; nor need it cross the first finger ahead of the knuckle joint, but may be allowed to sink a little into the hollow between thumb and first finger.

Finally, we shall not insist upon "pure arm movement" wholly, either first, or last, or at any other stage. Such movement has been thought necessary for speed; but finger-movement writers are at least equally speedy. It has been argued that only through arm movement can one avoid cramp and excessive fatigue; but shorthand writers, who make large use of their fingers, can usually follow a speaker at his own pace for a longer period of time than any clerks or bookkeepers find it necessary to write without rest.

And after all is said and done, a great many people, probably the great majority, who have had long training in arm movement as the *one movement*, simply do not use it when they are intent on getting things down on paper. In a class in history of education, I recently observed forty-eight students writing. All had been trained in "arm movement" penmanship, and nearly all had taken a semester of normal school training in it and were prepared to teach it. Thirty-eight of them had been drilled in it before entering the normal school, and for a period averaging over four years. Yet only one was using arm movement purely, while three others showed traces of it, as one might say. This unhappy ideal of "pure arm movement" in our schools, gives to pupils' writing a Jekyll-and-Hyde character, Hyde doing the writing in the writing class and Jekyll everywhere else.

The good writer does not let his arm and his fingers quarrel as to which shall do the work. He expects them to coöperate, like the members of a good office force. *Progressive* arm movement he always uses, and a certain amount

of *projective* arm movement usually develops with practice, both in shorthand and longhand; but it should develop with mature muscular coördination, and not be forced on young children.

The left-handed pupil. — The general course to be pursued with the left-handed child has already been indicated (in Chapter VIII). Just because he is left-handed he needs special attention and help, for penmanship, the lighting of the room, etc., are planned for the right-handed majority. He must lay his paper "the other way" on the desk, so that his left forearm, instead of his right, will be perpendicular to the line of writing; and he must write toward himself instead of away from himself.

This writing toward himself is awkward, and may prove difficult. We skate and dance symmetrically, to the right with the right foot, to the left with the left foot; but how about skating to the *right* with the *left* foot? In the same way, the right hand naturally makes the pen skate toward the right, and the left hand symmetrically skates it to the left. Fasten a sheet of paper before you with its hither edge parallel with the nearer edge of the desk. Take a pencil in each hand, and beginning with hands near together at the middle of the sheet, write your name rather deliberately with your right hand (moving toward the right, of course) and at the same time "tell" your left hand to move toward the left and duplicate every move made by its mate. (If you are left-handed, begin with hands wide apart and let them write toward each other, the left hand leading in the performance.) You will be surprised to find how easily you can write your name "twice at once." The name as written by the odd hand is in "mirror writing."

Mirror writing.[1] — Mirror writing is so called because it can best be read by holding it before a mirror. It is produced naturally by about 1 per cent of left-handed children (being about one child in 2500) the very first time they try to write. This 1 per cent probably represents the extremely left-handed, who may be either boys or girls, bright or dull, defective in some way or normal in all ways. Further, these mirror writers seem likely to be children who are motor minded, that is, who are guided, in doing anything like writing, by the way it "feels" rather than by the way it looks. They reverse their figures as well as letters, and apparently learn to read their own writing, just as any one of us, if he takes up typesetting, has to learn to read the type "backward" as it lies in the composing stick or galley.

This tendency toward mirror writing should, of course, be broken up. Parents and teachers should coöperate to break it up just as soon as it appears, that is, when the pupil makes his first effort to write, or even when he scribbles in the wrong direction. Those teachers who have been most successful in handling this problem have taken pains to give strong guidance, both external and internal. The pupil's hand is guided by the teacher's own, and for as much of the writing period as possible. The child's attention is also called to the way other pupils' hands are moving as they write normally. Internal guidance consists in forming bonds between the way lines *look* and the way one *moves* in making them. Simple straight lines are made (with the left hand, of course, unless there is good reason for changing handedness), the first sloping toward the left, the next toward the

[1] The facts of this discussion are drawn from Arthur L. Beeley's excellent work, *An Experimental Study in Left-Handedness*. The reader is referred to this for further detail.

right, and so on. Then simple curves are given, followed by ovals, e's, m's, etc., the mirror forms being omitted. As each new letter is taught, the teacher sees to it that he writes it in forward form, and not in reverse. To insure guidance in the teacher's absence the pupil is told, for some time, not to write without a copy before him. If he were to write from memory, he would probably go wrong spontaneously.

What responses, related to writing, can the beginner make? — The beginner in writing cannot make so many responses as we could wish. The child cannot make as accurate movements, nor respond as quickly to a signal, as an adult. He can touch accurately, is more sensitive to contact (and probably to heat, cold, and pain) than an adult, because he already has all the nerves he will ever have, and they are spread out in a smaller skin (and body). But he lacks adult motor control, and he lacks the adult "sense of rhythm" which, in the good writer, stands out so prominently. He naturally makes separate and distinct strokes rather than connected and flowing lines. Some sort of simplified printing would suit him better than a cursive hand in which the letters are joined together. In fact, some experts in child study would not have children taught to write till they are ten; and C. P. Zaner, an expert penman, says that "the child is not old enough to learn to write rightly until about ten years of age, and not old enough to *master* so difficult an art as writing until of high school age."[1]

Nevertheless, our beginner has already begun, very likely, by scribbling for some years at home, perhaps practicing a bad hand position because his parents knew no better, or

[1] *Zaner Method Writing, Teachers' Manual No. 1*, p. 1.

did no better, than to let him. If his reading lessons include script, the written letters are not altogether strange to him, though he probably has no bonds for them *individually*, but only for word-groups of them. Many children will be found to know the names of the letters when they enter school. And as soon as they begin to spell, the spelling and the writing bonds ought to reënforce each other very happily.

From old bonds to new, one difficulty at a time. — Writing is mainly a matter of sensori-motor bonds, and so it is easy. But these bonds are organized into inclusive units, and so it is difficult. Finished writing is a delicate and complex coördination of many movements, some of which are prominent in one person, some in another. There are tremendous individual differences. Consequently, we must not teach any one minutely organized type of writing as the only acceptable type, but insist only on those essentials which are common to all good types.

Following our plan of taking first the bonds that are easiest to learn, that occur most frequently, and that prepare for the greatest number of other bonds-to-be, we shall consider, in the order named, *Materials*, *Position*, *Progressive Movement*, *Rhythm*, *Letter Formation*, and *Self-Criticism*.[1]

Materials. On the old-fashioned farm, the beginning boy was usually given the poorest tool in the lot, on the ground that whatever he used would be ruined. Our child, in his struggle to write, must form no jerky, poor-pen, or rough-paper bonds. No unusual kind of material need be furnished, however. For the first grade pupil, some teachers prefer a pencil larger than usual. Pen and ink are used in some schools in the first grade. Most teachers prefer the pencil

[1] Substantially the order adopted by Freeman. See *The Handwriting Movement*, Ch. VI.

until well toward the end of the second year, or early in the third. The ordinary "ink pen" is dauby in the hands of young children. If they could be furnished with well-behaved fountain pens with suitable points, not too fine, probably the pen could be used advantageously from the first.

Position. This has already been described. Through several of the first lessons, attention will have to be centered quite largely on position of feet, body, arms, hand, pencil, and paper. Some teachers have a count or command for each one of these items which is used at the beginning of each lesson until the responses become automatic. Position, particularly the position of the hand, must not be too minutely standardized. Very early in the course, there ought to be a study of individual hand positions, with individual suggestions for individual needs.

Progressive Movement. To teach both form (of letters) and movement at once is to introduce more than one difficulty at a time. Exercises in progressive movement are easy to execute; the movement is a part of all writing, and so prepares the way for all the bonds-to-be. Many prefer to have the first work in writing done on the board. This usually consists of ovals, etc., followed quickly by the introduction of letters. Form is then taught at the board and progressive forearm movement at the seat, so as to separate the two difficulties. There is no harm in this method, as the pupil must learn blackboard writing sometime; but it is not essential to good paper work. Let the pupil practice as you want him to perform.

The very first movements in writing may well be such as those illustrated in Figure 24. The hand at first merely swings from side to side, using the pivot point near the

elbow as a center. Then come the straight line, the wave, the jog, and at length, simple letters. At least a part of these exercises should be done to count or command, with

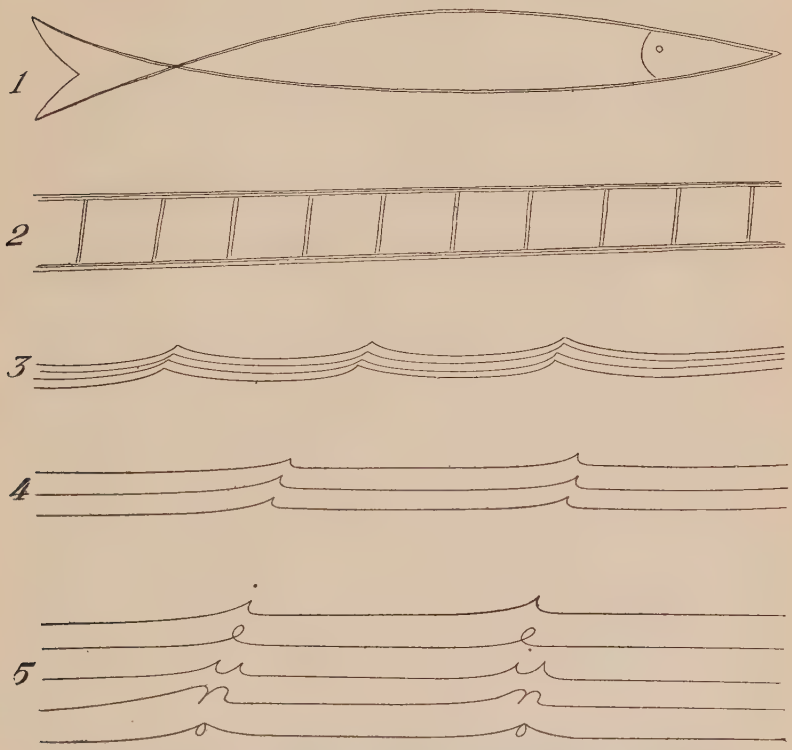

Fig. 24. First exercises. To secure good progressive movement.

the rhythm strongly brought out. Similar exercises should form the introduction to every lesson that is given, for several weeks.

Rhythm. The best way to introduce an exercise of this kind is by counting for the pupils, often putting words of

command in place of the numbers, as "Swing — jog — swing — jog — jog — swing." The metronome and the phonograph are both useful, in the beginning, to relieve the teacher and enable her to make visits for inspection and aid.

The nervous system is happiest and most effective when its impulses of energy are released with perfect regularity. This equality of time between beats cannot well be maintained except in simple exercises. If it could, the rhythm of writing would be like the rhythm of poetry instead of the rhythm of prose. But by pausing at appropriate points, by making the downward-and-back strokes slowly and the forward-and-up strokes rapidly, and so on, we can bring into writing a "swing" that aids in letter formation, in movement, and in every other way. As we take up the more complex letters and combinations of letters, it is probably best to give up the use of the equal-time interval (together with the use of the metronome or other mechanical timer), and to substitute words of direction almost wholly for counting. In writing *the*, for example, one might lead his class with "*Up*, and *up*, *down*, *up*, and *up*, — *cross*," pausing on the second *up*, and on *down*, as one naturally would at the top of the loop and at the bottom of its finishing stroke.

Letter Formation. There are four points in letter formation — *size*, *form*, *elements*, and *connections*.

Certain expert teachers of writing insist that young children should make large letters, not only at the board, but on paper. "Whether this is a justifiable pedagogical procedure is questionable," says Watson, "since by the time they reach the writing age fine finger movements are undoubtedly possible: the child merely has to learn a double

set of habits."[1] Very likely the large writing is not only unnecessary but undesirable.

It was thought by teachers of old time that when a child made a poor letter, he did it because his mental picture of that letter was incorrect, and so they centered their efforts on stamping the form of that letter on his mind. But letter form is comparatively easy to teach, especially since considerable individual variation in letter form is quite permissible so long as the writing is legible. It is the idea of the necessary movement that the child lacks, and also control of that movement. Each letter should be introduced by some kind of free movement exercise that naturally leads to it.

Again, with their minds on form, the old teachers analyzed the letters into straight line, right curve, left curve, etc., and grouped the letters into classes according to their *looks;* whereas they ought to be classified according to the way they *act,* that is, according to the rhythmical units that stand out when we make them. For example, I should put *a*, *d*, *h*, *q*, *t*, and *y* into one rhythm-class (since they *feel* similar when I make them), *b*, *f*, *i*, *j*, *o*, *v*, and *x* into another, *c*, *r*, *z*, and perhaps *s* into another; *k* and *p* seem alike. I would even suggest introducing the classes of letters according to the simplicity of their rhythm plan.

Capital letters and figures also need careful study.

The connecting of letters compels the pupil to pass quickly, and sometimes confusingly, from the rhythm pattern of one letter to that of another which may have a different swing to it. Compare the smoothness of writing such a word as *the,* or *had,* with the jerks one must go through in writing *park.* Fortunately, in writing connected

[1] John B. Watson — *Psychology from the Standpoint of a Behaviorist,* p. 281.

letters, one can nearly always pause and poise when the pen has reached its highest point in any letter or unit part of a letter. The pupil should have his attention called very forcibly to this, and repeatedly.

Four letters, *b*, *o*, *v*, and *w* (together with one form of *r*), need special attention; for the stroke which finishes them and connects them with the letter following does not start from the base line, but from a point whose height equals that of a small letter. These four bonds cause special trouble and need special drill.

Self-Criticism. — We "go on to perfection" fastest when we realize just where our imperfections are and try to remedy them. The pupil should see a good model before him, either flowing from the teacher's fingers or furnished otherwise, and learn to criticize his own product with regard to the smoothness of his lines, the straightness of the line of writing, the shapes of the letters, their slant (especially whether they all lean the same way or seem to be "dancing a jig"), the spacing between them (particularly as to whether it is uniform), and speed. We can keep these six points in his mind by leaving on the board for a time an outline something like the following:

S { moothness
traightness
hape
lant
pacing
peed

The child's writing powers seem to develop with regularity; for measurements reveal continuous progress in both form and speed through the whole elementary school period.

Readiness. — For writing in general, readiness is not a difficult problem, as children have ever-ready bonds for scribbling and for the writing movement; besides the idea of communicating thoughts on paper in a way that is a mystery to the ignorant has the charm of magic about it.

In connection with lines like those that form the back of the fish (Fig. 24), Freeman uses the rhyme,

> To and fro sway the trees,
> Bending in the passing breeze,

and for similar lines such as those that form the under part of the fish, the rhyme,

> How do you like to go up in a swing,
> Up in the air so blue?

Playful ideas like these, the making of "engine smoke" (repeated ovals), and so on, keep things moving happily during the brief period before letters and words and short sentences can be introduced.

One of the most difficult points is to get the pupil to do good writing, not only in the writing lesson, but in all lessons. In the early grades, children should not be assigned a task that will require writing when the teacher cannot supervise it, and all dictation should be given very slowly. Pupils under ten years of age ought not to write much. In higher grades, many teachers have gotten good results by telling pupils that their mark in writing would be made up, one half from the writing lessons and one half from the writing done in other lessons.

Measurement of the writing by some standard scale (see below), and the challenge to "beat the last batch" are strong means of motiving.

Nor will the tactful teacher be above permitting the use of colored inks when they can be procured. Do you recall how it used to thrill you when you were permitted to write from the red bottle?

Guidance. — The best guidance of all is the teacher's writing, together with her showing, such as taking hold of the pupil's hand, adjusting it into good position, moving it, swinging his arm, etc.

To teach form, Montessori used sandpaper outlines of the letters; Ellsworth used brass plates with the letters formed in grooves which guided the pupil's pencil; and many teachers have well-made letters retraced again and again. This last is best, for extensive teaching of form without attention to movement and rhythm is wasteful. Some have the pupil trace the letters in the air.

Exercise. — The time given to writing is usually fifteen or twenty minutes a day through several grades. Investigation seems to show, however, that the excellence of the product does not depend so much on time as on concentrated attention and the teacher's determination to get results. In general, attention to writing gets good writing and neglect begets scribbling.

Special exercises may be necessary at times for special purposes. For instance, if pupils do not separate the writing fingers from the "runners," it may be well to have them curl the ring and little fingers under, thrust out the other three so as to meet at a point near the tips, and make repeatedly a movement "like a chicken picking up corn," only not so jerky. This is a decided aid to projective finger movement.

If progressive arm movement and rhythm are well taught, and the hand is kept in good position, a certain amount of

projective arm movement — all that is desirable — will incidentally develop in time. No special exercise for "arm movement," as this is commonly called, seems to be desirable.

To facilitate letter joinings and make sure that all bonds are practiced, pupils may be asked (if the exercise does not prove tedious) to write *aa, ab, ac,* on through the alphabet, *ba, bb, bc,* on though the alphabet, and so with all the following letters. This may also help, at the proper time, in the learning of these letters, both as to form and name.

Effect.— The method described in this chapter is especially wholesome in its effect; for it does not require strained position, nor impossible movement, nor the attainment of an ideal too far beyond the Alps. If we go only so fast as our class is ready to go, making due allowance for individual variation, the tonic of success will be felt from the outset.

We can of course mount samples of best writing, and in other ways "recognize and reward the right response." There is no more reason for using banners, buttons, pins, special diplomas, and other paraphernalia in this branch than in any other. But very likely it would be wise to follow the Boy Scouts and have a Merit Badge for high class work in every branch.

Testing essential bonds. — Various scales have been devised for measuring the quality of handwriting.[1] The first, and one of the simplest, was that of Thorndike (published in 1910). It consists of a number of different styles and quali-

[1] The Thorndike Scale can be obtained from the Bureau of Publications, Teachers College, New York City. The Ayres Scale is furnished by the Russell Sage Foundation, New York City. Strangely enough, neither of these widely used scales contains the figures; yet these are more important, in many places of business, than the letters.

ties of actual writing, arranged in order from best to poorest through a total of eighteen steps. Speed is commonly measured in terms of letters written per minute.

Any sample of writing is rated by simply moving it along past the different standard grades until that one is found which it appears to match most closely. Children can grade their own writing fairly well, and should be encouraged to do so from time to time, as the noting of progress, or the lack of it, constitutes a strong stimulus to improvement. As a further guide and stimulus, Freeman has provided a "Chart for the Diagnosis of Faults in Handwriting,"[1] for use by teachers and pupils. The employment of means of this kind has been known to raise considerably the general level of writing throughout whole school systems in a comparatively short time.

The standards in speed and quality commonly quoted for each grade are as follows:

Grade	I	II	III	IV	V	VI	VII	VIII
Speed (letters per minute)	20	31	38	47	57	65	75	83
Quality (Thorndike scale)	6.5	7.5	8.2	8.7	9.3	9.8	10.4	10.9
Quality (Ayres scale)		27	33	37	43	53	57	65

The writing of the future. — Various investigators believe that some form of shorthand could be adapted to general use in a way that would greatly simplify the matter of handwriting. This is probably true. Very likely, writing could be made simpler to learn and more rapid to write. At the same time, it could be made phonetic, so that instead of writing words as they are spelled, we should write them as they sound. As one result of this, the subject of spelling would practically be wiped out of our curriculum.

[1] Published by the Houghton Mifflin Company.

CLASS EXERCISE

Analyze the small letters of the alphabet and put them into classes according to the rhythmical units[1] that appear in each. A good way is to begin with *a*, noting the kind of rhythm that appears in it when it is skillfully and quickly written, and place it at the head of a column. Next try *b:* it has a different rythmical swing, and so is placed at the head of another column. So with *c*. *D* proves to be like *a* in rythmical make-up, and so is placed under it. *E* heads a new column, while *f* should probably be classed with *b*. In this way, work on through the alphabet.

Not all may agree as to the units of execution that appear in each letter. In such cases, let the majority (or plurality) rule as to how the letter shall be placed in a class with others.

Which class of letters has the simplest type of rhythm? Which the most difficult to execute? Grade the classes in order as between these two extremes. Would you teach the letters in this order? If not, in what order, and why?

If time permits, classify the capital letters, and also the figures, in the same way. Where there is more than one type of capital, use a very simple type.

FOR FURTHER STUDY

1. What has been the history of your own development in handwriting? How, if at all, do you wish your training had been changed?

2. What shall we do about the many extra movements that a beginner nearly always makes when he writes? If they are not of an offensive nature (such as sticking out the tongue), do you see any objection to them?

3. Watch some good writers as they pass from the left side of the page toward the right. Does the penholder remain parallel to its first position, or change its angle, pointing now to left and

[1] A rhythmical unit is a movement that occurs between two pauses, and is made without a break.

now to right? What does the good writer do to keep the line from curving down at the end, roll his hand to the left (pronate it), bend his wrist, or what?

4. Try shading your letters rather heavily and see whether it interferes with your usual writing rhythm. In the teaching of writing, shall we say or do anything about shading?

5. Get some standard writing scale and measure your writing by it. Are the speed and quality of your writing such as a teacher's should be? (You can get the speed by writing steadily for two or three minutes and then counting the letters written. How many per minute?) If not, can you make them so?

6. Try whether it is true that you can write various slants of writing, with the same general movement, by placing the elbow at different distances from the body.

7. Some think it discouraging, and others think it inspiring, for a child to have before him the perfect copper plate writing usually found in copy books. What has been your experience in regard to this matter, and what do you think about it? Why?

8. Certain systems of measuring the excellence of writing require that posture and movement be graded, as well as quality and speed. Is there any more reason for grading posture in writing than in reading? Or is good posture to be taken for granted, as a matter of hygiene, in all branches? What per cent of total teaching time can a teacher be expected to spend in measuring results, and what per cent should he spend in getting results to measure?

9. To what extent should business men be allowed to fix the standard of writing which the schools shall be expected to maintain?

10. If a pupil can produce very good writing at a speed of (say) 70 letters per minute, do you care by what method he produces it so long as he is not violating the laws of health?

11. "The conditions of good writing are several, and rarely does one writer exhibit them all. Good writers usually have some unfavorable characteristics and poor writers are not usually so

hopeless as to have no redeeming traits." (Frank N. Freeman, *The Handwriting Movement*, p. 31.)

What does this indicate with regard to individuality in writing?

12. Speed and quality of writing do not interfere with each other in the lower ranges of the two; but they tend to crowd each other out in the higher ranges, great speed interfering with the best quality and vice versa. What shall be our ideal?

13. Do you know of any who have had very little training in penmanship but are nevertheless good writers? Any who have had long tuition and practice and still write poorly? What does this show as to native ability? Do you think there are any who never can learn to write well?

14. Show how "touch writing," similar to touch typewriting, the eye of the performer being kept on his copy, would be useful, to one who was going to spend his life addressing envelopes, making copies of documents, etc. How would you train a pupil in order to make him skillful in it?

15. What practice should a pupil have, before he leaves school, in writing and thinking at the same time? Why?

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CHAPTER X

Spelling

Exercises. — 1. Count all the silent letters in the words of any good sized page or column of solid print. Find the whole number of letters, sounded and silent, in this page or column. (You can get the whole number roughly by finding the average number of letters per line in the first few lines and then multiplying this average by the total number of lines.) What per cent of letters are silent? Results for the class may be combined.

One investigator finds that more than one half of all the errors made by children in spelling consist in leaving out silent letters where they should be or putting them in where they ought not to be. What can we do about it?

2. Turn to a foreign dictionary, such as the French or Spanish, and select six fairly long words to learn to spell. If you have no foreign dictionary handy, take six English words of about three syllables and write their spelling backward, as *otatop;* or select some strange words, quite hard ones, from the English dictionary; or, combine these ways of making up a brief word list.

Learn the spelling of these words, watching how your mind works as you do it. What do you want to know about a new word? How do you feel toward it? How would you want a teacher to proceed in teaching it to you? Do you care to use it in a sentence? Can you write it easily as soon as you can spell it aloud? Try to discover and answer other pertinent questions about your learning process.

How much that is true for you probably holds true for children when you teach them to spell?

Our fashionable spelling. — Words and clothes have both changed greatly in appearance since the days of George and Martha Washington. Fashion has had a great deal to do

with it, in both cases, while reason has often been shoved aside. In 1783, Noah Webster brought out his *American Spelling Book* (the one called "blue-backed" — though the front of it probably looked bluer to a child than the back did), and in 1827 his *Dictionary of the English Language*. These have both helped to put spelling into uniform. In fact, spelling has become so strongly standardized that there is no room left for individuality. Many of the original spellings that children invent are much better than those in the dictionary, but there is no way of enforcing them. A word will no more let you change its appearance than a soldier will let you pin anything on to his uniform.

But there might be a better uniform.

Which words shall we spell? — There are over 500,000 words in the English language, and they all have to be spelled some way; but fortunately, no one has to spell them all, and no one person can. The old-fashioned spelling book went as far toward being a dictionary as it dared, containing in some cases as high as 15,000 words. The modern teacher does not try to teach more than about 200 words in a semester, or a total of 400 words a year. This means that unless we give more time to spelling than we now do (usually about 20 minutes a day), we can not hope to teach a child all the words he will ever use. But we should not need to, any more than we need to help him get, as he goes through the eight grades, all the dollars he will ever use. We must teach him how to master both words and dollars, so that he will always have at his command a reasonable number of each.

What bonds shall we build? — Since the unabridged speller is no longer popular, what spelling bonds shall we form?

Those that will be used most, surely. And which are they?

To answer this question, quite a number of investigators have compiled lists composed of the words found most frequently in such writings and printings as business letters, newspapers, magazine articles, the Bible, classic authors, family correspondence, and compositions written more or less spontaneously by school children. One of the best known of these now rather numerous lists is that of "the thousand commonest words," which Leonard P. Ayres prepared by combining the results of four other studies.[1] He reached the surprising conclusion that nine words reappear so frequently as to constitute one fourth of all we write. The most common ten words, named in the order of their frequency, are *the*, *and*, *of*, *to*, *I*, *a*, *in*, *that*, *you*, and *for*. Fifty words with their repetitions, all of them of one syllable, make up one half of all we commonly put on paper.

An extensive examination of children's vocabularies indicates that the mastery of 4000 or 5000 words will enable the average child to say neatly about all he commonly needs to say; and spelling experts have concluded that the duty of the elementary school is done when it has fitted up a child with a capital of some 3000 or 4000 well-selected words and taught him the use of the dictionary.

Where can we find the best words? — If you had to make the acquaintance of some three or four thousand people only, you would want to know that they were worth while, the best in the country. Similarly, a child can not afford to spend his time hobnobbing with words of low caste. The best place to find "the four hundred," or the four thousand,

[1] See *A Measuring Scale for Ability in Spelling*, published by the Russell Sage Foundation, New York City.

or whatever number we wish to teach, is in a modern speller. Some teachers prefer to make up their own lists, and they ought to do so to the extent of supplementing the general list with local and special words and correcting grade errors;[1] but trial shows that beyond this, teacher intuition is not keen enough to detect the words that most need to be taught — nor the words that need to be taught most, that is, those that are most difficult for pupils to learn.

Further, among the various word lists found in numerous good spellers or elsewhere, no one is sacred or supreme. To find the three thousand best words is like finding the three hundred best books. A certain limited number will always be included; but beyond that, election is open to all. There is something much more important to do than to strain after the impossible one best list.

Situation and response. — The "more important" thing is to teach the pupil to respond successfully to all spelling situations. The spelling situation consists in the would-be speller's taking his pen, or his typewriter, or a sign-painter's brush, or a printer's composing stick, or a linotype machine, or a rubber stamp printing outfit, or some other instrument of expression, in order to say something in letters. The response consists in putting into each word just the letters that belong there, and in arranging them in the right order. The courageous, determined speller achieves this by making an attack on each new word as it approaches (if he expects ever to have use for it) no matter how thick its ancient

[1] Courtis gives a minimum list of essential words to be mastered with great thoroughness, and a list of supplementary words to be mastered, but not so automatically as the minimum list. In addition, each teacher spends one day a week on local and special words. See *Teaching Spelling by Plays and Games*, by S. A. Courtis.

armor of silent letters may be, and by taking it prisoner, perhaps in his notebook but certainly in his head. To insure success, he makes an alliance with a word book, usually a dictionary, attaches it to his Intelligence Department, and summons it to meet every emergency.

It is not merely a spelling list, but a spelling habit that we want to leave with these young users of letters. Society makes it our duty to build up in our pupils a "spelling conscience" so keen that whenever a misspelled word flows from the pen, they will regard that pen as having stabbed and mutilated the English language. This spelling habit and spelling conscience both require the support of the dictionary. In the upper grades, the dictionary bonds should be practiced upon until the pupil comes to feel that his word book is a kind of brain annex.

Stimulus and reaction. — More narrowly, and in the case of each particular word, just what is the stimulus and what the reaction that we want to establish?

At first, and in school, the stimulus may seem to be "teacher pronouncing a word," and the reaction, "pupil spelling it orally or in writing"; but at last, and out of school, the stimulus is usually "thinking of a word," and the reaction, "writing the letters of that word in order." This means that the stimulus for the spelling bond has been *taken inside the brain*, that is, has become what is called in psychology a *stored stimulus*, — stored in the brain cells. In other words, when we sit thinking, as in writing a letter, one bond in the brain sets off another.

But what does "thinking of a word" mean, and how do words get inside our heads so that we can think of them? In general, there are, for words, two roads leading into the brain and two roads leading out. The roads in are through

eye and ear: by looking at words and by hearing them, we form eye bonds and ear bonds for them, so that we can "see them in the mind's eye," form mental pictures of them, or hear them in the mind's ear, when they are no longer in our presence.

The word-roads that lead out of the brain run through mouth and hand: we speak words and we write words, and both the speech organs and the writing muscles report back to the brain every least thing they do. In this way we acquire very complex *motor bonds* (as we might call them) with stimuli stored in the brain.

So it comes about that we can think of a word in four ways: how it looks, how it sounds, how we speak it, and how we write it — or we may combine these ways. As I write this on my typewriter, I find that the successive words seem to speak themselves within me. The next word that I want to write, *floats*, floats before me as a kind of little printed patch about so and so long, with the letter *f* sticking up at the beginning and the rest indistinct until I turn attention to each letter separately; but these eye bonds quickly start hand bonds. The word turns into a series of movements, the hand movements necessary to write *floats* on my machine, with the *f*-movement (that of the left index finger) leading off strongly. The word, for me, now has become a movement pattern.

The most common stimulus seems to be "inner speech." — By inner speech is meant "saying a thing inside of us," or at least making a movement toward saying it. The ear is connected very directly with the vocal organs, and largely controls them. The best voiced person would not be able to sing if he had been born deaf. Further, children hear and speak words for years before they are able to read and

write. They (like many grown people) "think aloud," talking to themselves, and the inner talk is commonly kept up after lip movement and voice are inhibited. When reading begins, the words are, for a long time, the very ones the child has been hearing and speaking: eye bonds are connected with ear-voice bonds. It is no wonder that (as Huey found) reading is characterized by inner speech.

Then, too, inner speech is an especially appropriate stimulus to spelling, for the pronunciation of a word is invariably the key to some of the most important letters that compose it.

When you flash a strange word before a learner, his first question (at least as soon as the word means anything to him) is likely to be, "How do you pronounce that?" In studying and reciting spelling, pupils should be taught to use their lips (but not necessarily their voices) and to use them with a will, shaping with energy and precision first the whole word and then its separate letters.

What bonds are necessary to spell a word? — To understand spelling in all its glory, we must not think merely of a single-track bond running from eye or ear to vocal cords or hand. There are many supporting bonds, as we may call them, sensori-motor paths that underlie and help or hinder the letter process. To make this clear, suppose you take a spelling lesson in Europe.

A spelling lesson in German.— You are in a German school, and the teacher places before you Kahn and Schloß and Edelmann. Let us suppose you are so unsophisticated (as children often are with our English words) that you not only do not recognize these funny looking collections of letters, but you have not even had experience with the objects they refer to. Well, then, the teacher had better take

you out for a ride in a Kahn (boat), let you explore the Schloß (castle) and have you meet the Edelmann (nobleman), at the same time using these words many times and in many different connections. After that you must learn the German letters by sight, and their names, and the various sounds they and their combinations may stand for. Then learn the order of letters in these three words, and you can spell them.

But your troubles are not yet over, for the teacher wants you to write your spelling lesson. You must learn the German script. This will cost you some effort, and as it introduces more than one difficulty at a time, you will often misspell words that you "really know how" to spell. Perhaps the teacher will scold you for carelessness. Besides, this elaborate script will change the appearance of the words you have by now learned to recognize in print: Kahn and Schloß and Edelmann will now appear as *Kahn* and *Schloß* and *Edelmann*.

A complete outfit of spelling bonds. — From the beginning of experience, then, to the last letter in the spelling of a word, the following connections are necessary.

1. Bonds for the object (action, or what not).
2. Bonds between object and word, and between word and object.
3. Bonds for word as a whole, heard, seen, and spoken.
4. Bonds for letters of the alphabet, seen, named, and written.
5. Bonds between each letter and its sound, or sounds.
6. Bonds-in-series for letters-in-order, especially written.

What responses can the child make already? — When spelling starts, say at the middle of the first year in school, the pupil has connections of the first three kinds, and usu-

ally quite a number of the fifth. In lower grades (I should say up to the seventh), the words for spelling should be selected from those that pupils already know in a general way: that is, they should already know the meaning of each word (bonds of the first and second classes), and they should have seen it often in print, and heard it and spoken it in conversation or class work (bonds of the third class). There comes a time, however, when it is foolish to limit the study of spelling to the words children have been found to use in writing letters or compositions: the question is, rather, what words would they use if they were made masters of them. There comes a time when a child is as eager for new words — often long and impressive ones — as a girl is for new dresses. Not to teach a word until children have been found trying to use it is to establish a situation like that of the Irishman who was struggling to pull on a pair of new boots: "Begorrah!" he exclaimed, "I'll niver be able to get these boots on till I've worn thim a toime or two!"

Our modern method of teaching reading, which leaves the names of the letters untaught, throws the teaching of the alphabet into the first grade spelling class. If you read any foreign language that has also a "foreign" alphabet, such as German or Greek, you know that you can go on reading it long after you have forgotten the names of the letters, and even when you have so far forgotten their shapes that you cannot draw them well. Even in grades several numbers beyond the first, it is worth while to review the alphabet before beginning to spell and to use the dictionary. It is not difficult to find fifth and sixth grade pupils who do not know the alphabet, at least in dictionary order.

Further, if words are to be written, the pupil must be able to recognize, name, and execute the written letters easily.

This should be taken care of in the writing class; but with the overspeedy ideal of writing and the faddish methods of teaching it that are abroad in the land, the writing process is a serious interference with the management of all matter that must be written, and it probably remains an interference up to the seventh grade or beyond.

"About fifty per cent of the poor spellers will be poor writers also," says Courtis. There is evidently some connection between them. He advocates, for many of these, practice in writing legibly as a means of making their bad spelling good.[1]

In bonding together the appearance of a letter and its sound (or sounds), the teaching of reading has helped greatly toward spelling. Most methods of teaching reading embody at least some study of phonics. By the time our little first-grader begins to spell, the sight of a consonant will usually suggest its appropriate sound, vowels are likely to suggest — something at least; and he will also be able to give the sounds of a number of phonograms, combinations of letters that carry a certain sound, as *tion*, *ain*, *ead*, — trunk line bonds that help in the spelling of many words. But we must keep in mind that these reading-bonds work from sight to sound; and we must now form the connections that run from the sounds of words and letters to their appearance, to their names, and to the making of them in script (as you had to learn the German script).

Ready-made responses in upper grades. — If we dictate a spelling lesson, before it is studied, to any grade beyond the first, we find that some of the words are already known; and that the pupils can "almost spell" some of those they miss. Pupils learn, of themselves, to spell more words than the

[1] S. A. Courtis — *Teaching Spelling by Plays and Games*, p. 9.

teacher teaches them. Words already known need no attention, and words partly known need very little.

Tidyman's plan [1] is to dictate to the class, each Friday, all the words in the following week's work. They are then spelled back to the children (at least in all grades above the third), who mark the errors. The teacher next asks how many missed each word, and counts the hands raised. As the children have been told that this has nothing to do with their "mark," there is no temptation to cheat; but to insure care and accuracy, the papers may occasionally be checked by the teacher. The number of those who miss any word, written over the number of pupils present, in the form of a fraction, gives what may be called the index of difficulty of that word for that class. If desired, all these indices of difficulty may easily be converted into per cents. The teacher then concentrates her efforts on the words that have the highest index of difficulty, and each pupil concentrates on individual difficulties. Tidyman states that this plan has been used for years in his school, and that it takes no more time than the ordinary method.

It would probably be better, in giving such a preliminary test, to tell the pupils not to write the word at all unless they were fairly sure they could spell it correctly.

How spelling bonds are related to each other. — To learn to spell a word is to form a series of bonds for its letters, so that each letter sets off the next one. If letters and sounds corresponded, one for one, in the English language, as they nearly do in Spanish and Italian, spelling would be easy for most people. But as it is, learning to spell such a word as *colonel* does not differ so very much from learning the symbol for a Chinese word. When letters do not correspond to

[1] Willard F. Tidyman — *The Teaching of Spelling*, Ch. II.

sounds, the task of learning them is much like that of learning successions of numbers. Fancy yourself committing such combinations as 7–2–8, 7–3–9–0–3–1–4, etc., and you will see clearly just what an illogical and meaningless job unphonetic spelling is.

As already indicated, some trunk-line bonds are found; and it is very likely that not enough use has been made of them. We find the combination *ough* in *cough*, *dough*, *rough*, *trough*, *tough*, and some other words. Why not group all these words together, even if they do not all sound alike?

Nevertheless, teachers of spelling must realize, and realize very keenly, that each word is largely an independent series-bond. A child may know well how to spell a thousand words and still not get, from all this bulk of knowledge, very much help as to the spelling of word No. 1001.

Do rules help? — In view of what has just been stated, it is evident that we cannot bring English spelling under the control of a few high-level bonds, called rules. Rules there are, but they are fearfully and wonderfully made, and with such numerous flaws in them that many exceptions slip through. The best practice seems to sanction the teaching of only a very few rules, and nearly all of these relate to the endings of words, that is, to the forming of plurals and to the changes made in adding suffixes. The children should be led to inspect these things until they discover that words, like tadpoles, show some regularity in the way their tails behave. They can then roughly state the rule and appreciate the better, book statement of it.

The grouping of words for teaching. — Since the list of most-used words has been sufficiently standardized for practical purposes, we have two problems remaining — the assignment of words to grades, and the arrangement

of words within a grade so as to make them easy to teach.

Our principles of teaching first the bonds that are easiest to learn, that occur most frequently, and that prepare for the greatest number of other bonds-to-be, give us some help. Grades one and two should be characterized by words that are easy to spell from sound and that are frequent in the pupils' use. Something can be done in the way of preparing for other bonds-to-be: *day* naturally precedes *daily*, *daylight*, etc. But one can learn the spellings of words in any order.

Both teachers and textbook makers disagree greatly in the matter of assigning words to grades. A study of five of the leading spelling books revealed the fact that not more than 19 per cent of the words in any one grade were common to more than two spellers. Some investigators have tried to find in which grade children actually do use the words first in their writing; but much depends on what words they have been taught and can use, and which they are encouraged to use. Beyond what common sense can readily tell us as to where a word belongs in the grades, the problem is certainly not one of the most vital importance.

Within any one grade, the words taught have usually been arranged according to one of two plans — grouping by meaning, and grouping by common elements, mostly phonetic elements. I venture to say that there is a third plan better than either. Since our object is to spell, words should be grouped according to the way they are spelled. If *dear* and *bear* have similar spellings, let us put them together whether they are pronounced alike or not. *Pie* should be associated with *piece*, and (perhaps) *nice* with *niece*. The easier letter forms will of course be placed first. I should

think words similarly spelled ought to be associated in our dictations; for it is *spelling* we want in our first dictations that embody a word, rather than any deep meaning in the sentences. I should not hesitate to give such a dictation as, "Dear Bear: What do you wear? Will you eat a pear? Come near. I do not fear you." Etc.

Introducing but one difficulty at a time. — In addition to grouping the words so that they will reënforce each other and grade from easy to difficult, we can help matters by dividing them into syllables while they are being studied. As Courtis says, "It is easier to remember three syllables of three letters each than one long word of nine letters."[1] It pays also to look for the tough places in words, such as the *ie* in "believe," the *ei* in "receive," and the *ich* in "which," and to put the effort right where the resistance is.

But we must also grade the processes which pupils go through in committing and reciting a word. Investigation shows that it pays to use all the "word roads," eye, ear, tongue, and hand. In class work, however, the hand should be used last; for it has had the least practice of the four, and may halt the process so much as to prove a hindrance to recall.

Assuming that a child knows the meaning and pronunciation of a word, and has a fair mental picture of it as a whole, we may proceed to have him print the letters of it on his brain cells by study, and have him reproduce them by recitation, using steps somewhat as below.

Study —

1. Recognition of word among other words ("picking it out"), in print or script or both, in book or on board.

[1] S. A. Courtis — *Teaching Spelling by Plays and Games*, p. 9.

2. Pronunciation and spelling from book or board, first orally, then in writing. (This may be done in concert, with care, and repeated at pleasure.)
3. Vivid picturing of word with eyes on it, then similar vivid picturing with eyes closed or with word concealed, with silent or whispered mouth spelling, followed by sight of word again to "check up."
4. Vivid picturing of word, followed by independent writing of it, then checking up by book or board to make sure it is right.
5. Writing drill, slow at first, then faster. (This may be regulated by having each letter called as it is written.)

Recitation —

6. Oral spelling (perhaps with use of word in sentence).
7. Written spelling, the words being given from a list.
8. "Dictation." Writing of sentences that contain the test words.

Of course we need not take all these steps, and in this order, with all children nor with all words.

Should vocabulary ever run ahead of experience? — As a rule, life should lead the way for language; we should experience a thing before we try to express it. At the same time, a new word is often a challenge to put our old experience together in new ways. In unearthing ancient cities, hollow forms are sometimes found which, when poured full of plaster, show some interesting human figure. A "new" word (really as old, perhaps, as the ancient city) is at first such an empty mold in the mind; but if we can pour it full of meaning, we repeat the experience of those who first felt the need for such a word. So do we gain a new counter

with which to play the game of thought, and a new tool with which to work our will on the world. For a word bears somewhat the same relation to the high-level processes that objects do to our low-level experiences.

In my judgment, all children of good verbal ability should be deliberately encouraged, at the proper age, to enlarge their vocabularies as a key to the enrichment of experience, keeping a private word book for the purpose.

Readiness. — A young man who entered a certain academy refused at first to do what he considered humiliating — to study spelling — but he finally consented to do this on condition that all the words to be spelled should be selected from the unabridged dictionary. We can soon convince our pupils that it is more of a disgrace to mutilate spelling than to study it. We can tell them such stories as that of the pupil who wrote to his former teacher, beginning his letter with, "My dear *Cur*," and saying he was pleased to "except" the teacher's invitation to visit him.

Just as a strong motive for learning to read is the desire to read letters, so, very likely, a strong motive for learning to spell is the desire to write letters, and to write them without odium and disgrace. Indeed, one is not sure to be understood unless he can spell, as we can show by the old story of the man who wrote to a friend in Africa, asking that some monkeys be sent to him. He wanted two, but his poor spelling and writing made the word read *too*, which was interpreted as 100. He was much embarrassed when he found a hundred monkeys on his hands.

Courtis has made extensive use of games in the teaching of spelling.[1] Competition is the principal motive in them all, the class being divided into two teams. The games

[1] S. A. Courtis — *Teaching Spelling by Plays and Games.*

consist in "straightening out" words whose letters have been jumbled, taking *e e e i v r c*, for example, and making *receive* out of it; in looking up a list of words in the dictionary and dividing them properly into syllables; in finding rhymes for words; in forming derivatives for words; in defining words; in filling in missing words, etc.

Dr. Hollingworth motivated her work by a variety of devices. The children made a dictionary and received a reward for it; they played store, cutting out pictures from store catalogs and spelling the name of each article in large letters; competitive games were played with words; and each child kept a diary of whatever interested him, taking special pains with the spelling.[1]

The great difficulty with spelling is the same as with writing, that is, to get it to "carry through" the other branches. The majority of errors in everyday work are due either to lapses of attention, the mind being on something else, or to failure to follow the good old rule, "When in doubt, get out." Tidyman asserts that about two thirds of the errors in spelling would be prevented if children, when in doubt, would ask the teacher or consult a dictionary. It helps greatly if they are trained in the habit of looking critically over what they have written, before passing it in. Experiment shows that children know, as a rule, when they have spelled a word incorrectly. In addition, we can "mark off" for words found misspelled in other branches.

Exercise: the use of spelling time. — Certain investigations have made it appear that spelling is learned as well when studied incidentally, in connection with other branches when the new words come up, as it is when book and drill

[1] Leta S. Hollingworth — *The Psychology of Special Disability in Spelling.*

are used. Almost certainly this is untrue unless the teacher is an expert in the incidental method. Almost certainly spelling is like eating: we *can* go munching through the day, thereby interfering with everything else, but it is better to stop at regular intervals and have a square meal.

Twenty minutes a day is not too much to spend on this ragged and random art; but it seems to be enough. Some schools devote four days a week to the spelling-book words, and the fifth day to local and other special words.

Class routine. — The general method of class work has been indicated above (see "Introducing but one difficulty at a time"). The oral spelling there provided for can usually be conducted rather briskly, the teacher pronouncing each word but once and assigning it, not in serial order, to some pupil who is judged to be just about able to spell it, the less able pupils listening. The pupil chosen should pronounce and spell it distinctly, preferably pausing slightly between syllables.

Below the third grade, writing is still so much of a hindrance as to make the dictation of sentences inadvisable. The written spelling should consist of words in lists, and there should be a liberal time allowance.

Tricking our tricky spelling. — Spelling is like love: it "must cling where it can, I say." Probably there is no one of us who does not have some trick for remembering a specially difficult word; and very likely we can help our pupils by suggesting these tricks to them. It is better to form a nonsense bond than no bond. One student had trouble with *Wednesday* until she learned to look for the "Wed" in it. Another remembers *believe* and *receive* by thinking of the *li* and the *ce* in *Alice*. *Connecticut* takes the form of *Connect-i-cut*. *Separate* and *grammar* are set

right by the fact that *pa* is in one and *ma* in the other. If a pupil has any "head" for spelling, then I venture to say that some trick can be invented which will remedy any misspelling with which he is haunted.

The tandem method. — Probably the nearest we can come to the tandem method in the teaching of spelling is to have the pupil ask the teacher or consult the dictionary in regard to a word of unknown spelling, and then to impress thoroughly that spelling. The teacher will often be busy, but the individual dictionary will not, and such a dictionary ought to be furnished and used from the fourth grade on. At first, special training in its use will be necessary. Perhaps the best way to begin such training is to have the pupil make a crude dictionary of his own. When he has learned how words are placed alphabetically in a dictionary, he will know how to get them out alphabetically.

Reviews. — These should come often, and be often written.

Words are like people: some are total strangers to us; of some we say that we "know who they are"; with others we have a "speaking acquaintance" but not a writing acquaintance; many we "come to know," and forget, and recall again when we have business with them; a limited number we know so well that we can draw the details of their faces.

Now, "old acquaintance" must not be "forgot and never brought to mind." Many teachers like to have a daily, or at least a weekly, review, a monthly review, a semi-annual or semester review, and an annual review. In addition, each grade should begin its year's work by trying its hand on the words of last year.

But there seems to be room for an honest difference of

opinion and procedure with regard to so much reviewing. Dr. Hollingworth called a word *learned* by a pupil when he was at least able to spell it on five successive days without error. Tests given after eleven weeks showed no "consistent weakening of the bonds," not even the beginning of forgetting. Indeed, her tests sometimes indicated gain, after a lapse of three months, and with "no intentional practice on the words involved."

Apparently the more mechanical teaching requires the more reviewing. The more interest in the beginning, and the more thorough the teaching, the less the reviewing. Best of all is the habit of "reviewing," in the dictionary, a word whenever it is needed and unknown.

Preventing errors. — In studying errors, we should ask two questions: What is the matter with the words? and What is the matter with the pupils?

The great trouble with the words is their silent letters, and the vowels with their many variable sounds. Most errors occur among vowels; for the consonants of a word form a kind of skeleton of it, sticking up, and sticking down, and coming to the front, and being sounded, and having for the most part but one sound apiece. It is the fluid and varying vowels that cause the confusion. In general, too, long words are harder than short ones. Children nearly always get the first letter of a word correctly; and in long words, the first and the last syllable stand a much better chance of answering the roll call correctly than does any intermediate syllable. On the average, the hard part of a word is the part that attracts least attention, and that is its middle.

These facts show us where to put the center drive in our teaching.

And what ails the children? Not special disability, for the most part.

> Over 80 per cent of the poor spellers in our Experimental Class spelled poorly from some cause other than special disability. General intellectual weakness, lack of interest, distaste for mental drudgery, intellectual inertia, previous learning in a foreign language, sensory defects, and bad handwriting are doubtless the most frequent causes of poor spelling.[1]

In general, the pupil who misspells a word either has not formed a definite series-bond for its letters, or something "switches him off" so that the wrong bond works, attention being asleep at the switch. Re-teaching the word is the cure for the first condition, and the cure for the second is everlasting watchfulness and the introduction everywhere of but one difficulty at a time. The causes of "switching off" are mispronunciation, faulty inner speech (as "quite" for "quiet," or "athaletic" for "athletic"), similar sounds (*s* used for *c*), similar letters (when writing *a*, it "feels like" *d* and so the pupil writes "sd" for "sad"), neighboring sounds (take a "peep" at the "people"), or neighboring letters ("the theeth" for the "teeth"). It appears also that some children become fond of a certain letter, perhaps as they do of a certain curl in their writing, and stick in that letter at every opportunity. The poor spellers make the same kind of errors (only more of them) that the good ones make and need the same treatment.

It has been found that merely calling attention to misspelled words by marking them conspicuously does very little good. A better way is to cross out the misspelling, write the correct form above, and have the word rewritten.

[1] Leta S. Hollingworth — *The Psychology of Special Disability in Spelling.*

Words frequently misspelled ought to be listed and brought into the spelling class for treatment.

In addition, each pupil must be personally conducted through his spelling troubles. This is not so difficult, either, for each pupil has, on the average, only about 50 words that he chronically misspells. He should have them in his list, and look at the list often.

Individual differences. — As we should expect, there is a great degree of difference among people in their ability to spell; ranging from the few who seem to need but one good look at a word in order to fix its spelling, through the average many who must make average effort, and down to the other few who cannot learn spelling with any amount of effort. There is no tag by which we can certainly detect the speller and the non-speller without having them spell. Both good and bad spellers may be bright or dull generally, with good or poor general memory, with or without sensory defects. All these things may have their influence, but the essential difference is in the brain, and in that part of the brain which has to do with the ordering and holding of letters, and the expressing of these letters through the hand.

Effect. — Probably this will take care of itself pretty largely. The social disgrace of being a bad speller and the honor of being a good one are commonly keener than they should be, even as things are. Within the demesne of the schoolroom, we shall need to direct our attention chiefly to the spelling done outside of the spelling class; and one of the best things we can do here is to see to it that the pupil is not overwhelmed with demands for words that he has not yet learned to spell. In addition, we must penalize, in some way, his misuse of words that he has had a chance to master.

The testing of spelling bonds. — In addition to the preliminary test described above, to find out what words we *need* to teach, we must test again in some way to find out what words we *have* taught.

Practice varies. Perhaps a monthly test, the words being delivered by column dictation, is a good standard to go by. Much depends on the reviews conducted, success in teaching the dictionary habit, the frequency of misspellings in regular work, etc.

Standard tests do not measure accurately the amount of advance a class has made in spelling, unless such a test includes all the words covered in the teaching. The reason for this is that each word is largely an independent piece of learning. In arithmetic, if a child can do long division, he can certainly do addition and subtraction; but in spelling, all bonds stand nearly on a level. No word stands for much of anything except itself.[1]

The spelling of the future. — It seems impossible that the English-speaking peoples will continue to carry the burden of their outworn spelling. Our spelling ought to become phonetic, and teachers should expend every effort to help all the agencies that are working in this direction. We can all help at least a little by using "fonetic speling" in our private correspondence whenever it will not cause too much shock, and by using, in the classroom and elsewhere, all the simpler forms that have received the sanction of any standard dictionary.

[1] The Ayres Spelling Scale can be obtained from the Russell Sage Foundation, New York City. The Timed-Sentence Spelling Tests are furnished by the Bureau of Coöperative Research, Indiana University, Bloomington, Ind.

CLASS EXERCISE

Make an outline of "Standard Procedure in the Teaching of Spelling," beginning with the preliminary test, to find out what words need to be taught, emphasizing the routine procedure considered best in the teaching of an individual lesson, and finishing with some method of testing results as a guide to further teaching.[1]

FOR FURTHER STUDY

1. How were you taught to spell? Shall you teach in the same way? Why or why not?

2. Have you a dictionary of your own?
Should pupils see their teacher consulting the dictionary frequently? Why or why not?

3. Write a few words, especially some that are rather difficult, and then report on your method of remembering a word. Do you see it, hear it, feel yourself pronouncing it, or what? What do you do when in doubt?

4. Let each report what tricks he uses in order to remember the spelling of words especially difficult for him.

5. One expert would have pupils write words in concert, spelling aloud as they go. They repeat each word faster and faster each time through, until at last only the most rapid writers are able to keep up. Do you approve of this method? What effect would it be likely to have on penmanship?

6. Why is it impossible to make any single best list of words for all children to learn? What should we attempt to do?

7. If a pupil is ear-minded, and seems to misspell words because his pen follows his ear, suppose we tell him to imagine his mother or his next best friend pronouncing the letters into his ear. What effect do you think this would have if he would use the device while studying spelling? How could you find out?

[1] Tidyman's *The Teaching of Spelling*, pp. 146–151, will be found very helpful.

8. If possible, procure a list of errors (as from a set of papers in some grade) and study them. What generalizations can you make? How would you plan to correct such errors?

9. Should diacritical marks be much used outside of the dictionary? Why? (Practice is against much use of them in spelling books.) How should a pupil get the pronunciation of a word?

10. What were the good and the bad points about the old-fashioned "spelling bee"? (This was a match in which one team spelled orally against another.)

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CHAPTER XI

Nature Study and Other Elementary Science: Life Craft

Exercise. — Following are quotations from experts as to what nature study is. From these, and from your own experience, try to determine the exact nature of the study and what is to be expected from the teaching of it.

"Nature study is . . . a study of nature." — *Comstock.*

"Many persons think they have tritely defined and disposed of the matter in saying: 'Nature Study is the study of Nature.' . . . Were we forced to define the term, we should say that Nature Study is a subject in which the teaching is for the purpose of developing certain mental faculties, such as observation, comparison, reflection, reasoning, judgment, memory, intellect, and even the conscience, and in which the material used to secure this development consists of the objects and phenomena of Nature." — *Surface.*

"Nature study is not elementary science as so taught, because its point of attack is not the same. . . . In nature study the work begins with any plant or creature which chances to interest the pupil." — *Comstock.*

"Does 'elementary science' mean exactly the same as nature study? I am forced to that belief." — *Bigelow.*

"*Nature Study is not the study of science*, as of botany, entomology, geology, and the like." — *Bailey.*

"I would by all means teach the young people the elements of the great sciences — geology, astronomy, and chemistry." — *Burroughs.*

"It should be clearly understood that nature study and science are not different subjects, but that they are two terms variously used to cover the same subject matter." — *Trafton.*

"These two things (nature study and agriculture) are one subject; they have a common educational value, or else none sufficient to make them worthy of a place in the schools." — *Coulter and Patterson.*

"Nature study is really a method rather than subject matter." — *Downing.*

"Nature study is learning those things in nature that are best worth knowing, to the end of doing those things that make life most worth the living." — *Hodge.*

The man who would be king. — You recall the story of the young Roman of royal family who went with his brothers to consult the oracle, to find out which of them should be king. And the answer of the oracle was, "That man who first kisses his mother, he shall be king." Immediately they all set off in great haste to find their mother, as a boy does when he expects strawberry shortcake, or a kingdom, or any other special prize. But one of them, wiser than the rest, pretended to stumble and fall when he reached the doorway; and as he fell, he pressed his lips to the earth. And so he became king.

For old Mother Earth is truly the first mother of us all. The man who knows her best, he is a king among men. The French have decided that the greatest Frenchman is — not Napoleon, but Pasteur — Pasteur, the "germ man," who taught us how to pasteurize our food, and control disease. And this leader of his people gained his greatness by his intimate acquaintance with our great common mother.

Nature study. — It is "natural" to study nature, since we are all sprung from her. And since we are alive, it is most natural, perhaps, to study living nature, the animals and the plants. In fact, that is probably what the term "nature study" first suggests to most of us. But even if we include all of inanimate nature, rock, weather, and stars, the phrase

is not the best one to fit all that subject matter which, in my judgment, should be regarded as one branch.

A boy plays at a pool. He finds that a tadpole absorbs its tail. So far, this is nature study. He cuts an alder, makes a squirt gun, and tries to find out why the water "sucks up" into it when he pulls the piston back. Is this nature study? He winds up his toy boat, watches it propel itself across the water, and then takes it apart to "see how it works." Is *this* nature study? Nature never made a spring boat.

Elementary science. — Science "carries on" in the same spirit of curiosity, inquiry, and truth seeking as nature study, but has a much wider range of subject matter; for it adds all the man-made things and ideas. From nature's round tree we pass to a cross section of it, which was the first man-made wheel; from plants and animals to foods and cooking; from eggs to the reason why a stale egg floats; from the rubber tree to bicycle tires; from water to water pipes, faucets, and boats; from air to ventilating appliances and the draughts on stoves; from a thunderstorm to electric bells and the waves of the wireless telephone.

But science, narrowly so called, must in its turn give way to a larger idea. For "a science teaches us to know and an art to do," and in dealing with the environment, natural or man-made, we must either do or suffer, and in many cases do or die. What we want in the elementary school is not alone "elementary science," but an elementary art, the art of dealing with all common things (and some uncommon things, perhaps) in a way that enables us to survive and be happy.

To illustrate, let us take two stories from Woodhull's remarkable book.[1] A firecracker, thrown into a little girl's

[1] John F. Woodhull — *The Teaching of Science*, pp. 146, 147.

lap, set fire to her dress. Her mother caught her up, rushed into the house, and put out the fire, but not until the little one had been fatally burned. Now, both mother and daughter may have learned in nature study that nature set the first fires by lightning or volcanoes, and they might also have learned in elementary science that if a bottle is lowered over a candle, the candle soon goes out. But at any rate, the one thing they needed and did not have is brought out by the second story. In this case, a four-year-old girl was playing alone with a match. When it fired, she dropped it into her lap and her dress began to burn. But "she had many times been taught what to do if her clothes caught fire," and so when the mother came in she found the little one holding her dress tightly wadded together in her lap. A hole about a foot square had been burned in the front of the dress, but the little girl had not even singed her hands.

In the United States, accidents have been carrying off children at the rate of 20,000 a year. More children of from ten to fourteen years die from accident than from epidemic diseases. What are the schools going to do about it?

Life craft.— Life craft is the knowing and doing of those practical things that enable us to live, and to be efficient, serviceable, and happy. Probably the best present embodiment of it is found in Scoutcraft, the craft of the Boy Scouts. The Scouts are trained in certain useful parts of nature study and elementary science, in the tying of practical knots, in first aid, fire building and control, simple cooking (sufficient to get a good dinner in the open), swimming, money earning and saving, what to do when lost, etc. They have merit badges for good practical achievement in agriculture, angling, archery, astronomy, bee keeping, bird study, botany, camping, cooking, firemanship, gardening, personal

health, poultry keeping, safety first, and many other lines of achievement in which certain of their number may wish to excel.

Life craft selects from the boundless store of stuff in nature study whatever is most useful and important for children to know, together with whatever happens to be very interesting to the particular pupils to be taught. But not all children are interested in nature study, and there is no more reason for troubling them with its useless details than there is for troubling them with the Greek alphabet and vocabulary. As one glances through the average nature-study manual or textbook, he is impressed with the fact that a great deal of what is there included might better be omitted so far as everyday usefulness is concerned — how the Dobson hangs head down in the water, how the snail crawls and breathes, the anatomy of a feather, how a wasp builds its nest. These things may be "nice to know," if one has time for a *nice* education; but so also are the peculiar properties of numbers, the unlimited details of history, the spelling of rare old words, and thousands of other things which have been omitted from courses of study for lack of practical use.

How much of nature study does the average person really use?

We should calmly ask the same question about elementary science. We must disregard the somewhat extravagant statements of such men as G. Stanley Hall [1] and Abraham Flexner,[2] to the effect that this branch, or these branches, are or should be "central" in the curriculum. No branch is or ought to be central, with all others subordinate, in

[1] In Hall's "Introduction" to Clifton F Hodge's *Nature Study and Life.*

[2] In Flexner's *A Modern School.*

the curriculum of all children; but let us have a union, a United States of branches, each yielding all it can to make childhood healthy, self-reliant, and happy.

What bonds do we want to form? — To help answer this question, let us refer to Woodhull.[1] He finds that many people, on looking obliquely into a mirror, have little idea as to where those objects are whose reflections they see, nor can they locate a star when seen reflected in a lake. He finds high school students who would as quickly use the short arm of a lever as the long one if they want to exert power, or take hold of a log by the middle instead of the end if they want to move it easily, or lift a heavy barrel instead of rolling it up an inclined plane, or stand on the outside of a railroad curve rather than the inside if they wanted to be safe. He asserts that we should try to make nature and her ways seem natural, and quotes with approval the following from Kipling:

> And we all praise famous men —
> Ancients of the College;
> For they taught us common sense —
> Tried to teach us common sense
> Truth and God's Own Common Sense
> Which is more than knowledge.

Primary handwork and elementary environment work. — In primary handwork, we found that our aim was to form a set of bonds which need not be taught in any fixed order, and which may vary a great deal from class to class, but whose general effect is to make the pupil handy with his hands. In elementary life craft, or environment work, our aim is to form a set of bonds which need not be taught in any fixed order, and which may vary a great deal from

[1] *The Teaching of Science*, pp. 3, 82, 83.

class to class, but whose general effect is to make the pupil *handy with his environment.*

Huxley used to say that science is organized common sense. Now, common sense is sense in common things. It comes, if the pupil has any capacity for it, from experience with common things, here a bit, there a bit, here and there a bit. It comes, for instance, by a boy's breaking hard-boiled eggs on his forehead, as we used to do at school: one soon learns to break the big end, and not the little one.

Pupils who have had what we might call an extensive course in common sense can often give correct judgments when they are unable to give good reasons to support them. They just "feel that it is so." Whence comes that feeling? From bonds formed long ago and no longer consciously working, but exercising an influence all the same. Further, such a child does not too early become known as a "book worm." "Safety first," in education, does not mean books first. It is a bad state a child has gotten into when he feels that everything must be done "just as the book says." Back of the book lies the Great Authority, the authority of things-as-they-are.

A brief catalog of essentials. — Following Spencer's classic catalog of "What Knowledge Is of Most Worth," [1] we may outline the essentials of life craft as follows: (1) Health-and-safety-first bonds. Here would be included what (and what not) to eat, drink, and breathe; how to quench fires, cross streets, dodge traffic, kill poisonous snakes, and so on. (2) Making-a-living bonds: which plants and animals are useful and which harmful, how to run a garden, the worth of waste paper, how money grows by saving, starting a bank account. (3) Taking-care-of-baby bonds: con-

[1] Herbert Spencer — *Education.*

sider the clean bottle and clean clothing, too much kissing and fondling, sunlight in the baby's eyes, etc. Younger brothers and sisters, no longer babies, should also be considered. (4) Society-at-large bonds: the killing of mosquitoes and flies, losses by fire (a half billion dollars a year in the United States), how the automobile helps to make us sociable and the wireless unites the world, and the like. (5) Joy bonds: there is beauty in nature and in human nature; there is much that ought to be enjoyed whether it is otherwise useful or not. The appreciation of the universe and its parts is a large fraction of religion.

Which "branches" contribute most? — All the subjects we now have in our school programs branched originally

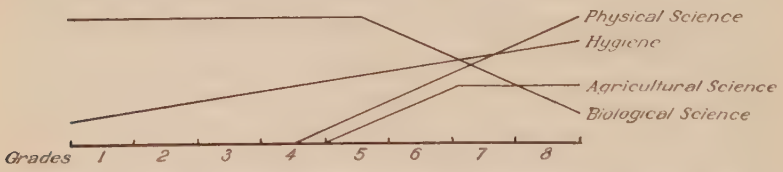

FIG. 25. Distribution of phases of science throughout the grades. (Figure from p. 4 of Gilbert H. Trafton's *The Teaching of Science in the Elementary School.*[1])

from a crude kind of life craft, from environment-study and human-welfare practice. It may help us to discover where most of our subject matter for elementary science and present-day life craft lies if we glance at some of these branches. Trafton's diagram for making this clear appears in Figure 25. But this should be regarded as suggestive only. For example, "Agricultural Science" would loom much larger in a country than in a city school. And

[1] In the Riverside Textbooks in Education, published by Houghton Mifflin Company, copyright, 1918. Used with the permission of the publishers.

further, looking at the matter from our present pragmatic standpoint, we should prefer to put "Art" or "Craft" in the place of "Science," and speak of *Physical Arts*, *Agricultural Craft*, etc. Our study of the physical arts would include such practical doings as tying up a package neatly and breaking off the string by the adept method of the good clerk.

What responses can the children make already? — In no other line of school work, probably, do we find the high and the low of the children's achievements so far apart. We can take nothing for granted, yet in many a school we find pupils who can teach the teacher in some favorite field — bird lore, perhaps, or wood craft, or the ways of the wireless. Much may depend on whether a child has been brought up in city or country, and still more on whether he has really been brought up by someone who is himself an efficient life-crafter, or just allowed to come up like the stray stalk of corn that fights its way with the weeds at the edge of the field.

What we must do is to find out, by trying, what our little people do and do not know, and we can often let those who know teach those who do not. If there is an outline of work for the course, we can at least find out, for each grade, some things that have not been taught. In the country, we shall find that many children know the common plants and animals, from the humble hepatica to that spirited combination of morning music and sunset glow known as a robin. Everywhere, most children will have established at least a starting point for knowledge, through experience with a pet plant or animal, a stove or a gas meter, a doorbell or a phonograph, a bicycle pump or a violin. Many will even have performed that chemical

experiment, so dear to parents and teachers, of using soap to remove dirt from a soiled skin; and let us rejoice in the freedom of a branch that is not too closely organized, but leaves us at liberty to begin almost anywhere and proceed to anywhere else at our pleasure.

Relation of the desired bonds. — Children often like a continued story, but not of the kind we find in the old-fashioned arithmetic. Abstractions, arranged in a complex logical order, make them educationally dizzy. Their brains grow best on sensori-motor bonds, simple or in series. Now, it is precisely characteristic of nature study, elementary science, elementary life craft, that most of its bonds are of the simple-and-single pattern. It is not, and of right ought not to be, organized like the science of the high school. To impose such organization on it is to commit one of the capital blunders of the day. We should look with commiseration on those who commit it, or who frown down on our well-meant courses and call them "scrappy."

Bonds in series are sure to appear in time, and it is Nature herself who introduces them, if we are her good disciples. We keep a calendar of the weather from day to day, noting condition of sky, direction of wind, temperature, and downfall; or we watch a seed, one side of whose growing-box is made of glass, and perhaps make drawings to show how it grows; or we watch a nesting bird, or the hatching of a hen's egg, noting successive observations. By and by, we have a whole string of observations strung on a thread of reason. With older children, such a string may extend through an entire season, as when we keep a diary of the coming of spring.[1] Later, the chronicle may run from season to season,

[1] It would add to the literary interest, perhaps, if we let Spring herself keep the diary: "April —. I started the pussies on the willows, and am getting

or from year to year, as we record the coming and going of the flowers, the birds, the seasons, the sun and the stars.

Trunk line bonds can be introduced according to the pupil's age and interest. Without perplexing him with definitions or mathematics, he can be brought to see that a ball, and a stream of water, and a ray of light, and many other things, all "glance" in the same way from a surface that turns them back. *Hot air rises;* and just as we make use of this principle to ventilate our houses, nature makes use of it to ventilate the whole world — that is, to make the wind blow. *Waves* are found in air, and water, and electricity. If we feel pestered by flies and mosquitoes, let us learn that everything appears to be pestered:

> Big fleas have little fleas
> Upon their backs to bite 'em;
> And little fleas have lesser fleas,
> And so *ad infinitum.*

From sensori-motor to high level bonds. — One of the curses that teachers frequently inflict on their pupils is that of requiring them to memorize "scientific" names and other very formal descriptive terms. They are like the parents who insisted upon having their daughter called Arabella Donatella when her playmates preferred to call her Belle. Children want to know how things work, and how to work them; but they also want, for the most part, what seem to them the shortest and most sensible names that will answer; and they should be gratified.

ready to bring out the skunk cabbage at the edge of the swamp." Etc. Such a diary helps also in the appreciation of *time* — last month, last year, many years ago. Here we help to form a basis for history, both human and natural.

The use of an outline. — One of the first points to consider in teaching life craft is to have an outline; [1] and one of the very next points is, not to use it too much. A good outline, like a good bill of fare, suggests to us what we *can* take, and the interests of the children, for the most part, decide what we *shall* take. To adopt as a whole an outline made for some other section of country, or to throw away good material because it does not happen to fit into our pretty outline — are both bad practices.

But we can make our own outline, with a few simple principles to guide us. To begin with, there is the child in the center, and there is the environment all round him. Whatever he needs to know or wants to know or do about this environment should, in general, be taught to him. This will vary, of course, with his age, and it will change with the changing environment, particularly with the seasons. Since the younger children are especially attracted to things that are alive and pretty, it is customary to study with them animals and plants, particularly those that are the most conspicuous; reserving the study of physical and chemical topics, the weather and other aspects of inanimate nature, for the more advanced years. But the child is the compass to steer by; give him whatever he naturally notices and is curious about, together with what he must have for "health-and-safety-first."

The principal topics to be treated, as we pass up through the grades, are birds and animals, wild and domestic, insects, trees and forests, flowers and seeds, gardening, weeds, weather, health (including some measure of school hygiene), home activities, plays, games and sports, the simple physics

[1] A most excellent "Outline of Science Instruction" is found in Part VI of Gilbert H. Trafton's *The Teaching of Science in the Elementary School.*

and chemistry of common things ("how they work"), agriculture, and social and public activities.

So far as "one difficulty at a time" is concerned, almost any topic in life craft can be treated in an easy way or a difficult way. Autumn leaves or gardening can be studied anywhere from the first grade to the university, depending on what we are trying to learn about the subject and how we go at it.

Readiness. — If we make our minute lesson plan first and depend on creating the interest afterward, we may come to consider life craft a vile thing to teach. We ought rather to follow that good rule, "Begin where you are, when you are there." It is a magnificent compensation for the rather loose organization of the subject, that we *can* follow such a rule.

Miss Comstock says the reason why the wild flowers may be used as a starting point in the study of plants is because the children love "these woodland posies," and have spent their happiest hours in gathering them.[1] As a child, my teachers would have found me very ready to go to the dear old brook banks where the teaberries and arbutus grew, to the cave not far from the schoolhouse, to the oak and the boulder between which the early hepaticas appeared, or to the shop where we could make some new "contraption." Anything suggestive of these would have kept me awake in the schoolroom. We still study nature at our house, and we "begin where we are." From my study window I observe a sparrow alighting so heavily against the base of a dandelion stalk as to bend it to earth, making his way out along it to the fluff of seeds and putting them away properly. A robin brings two of her young, almost

[1] Anna Botsford Comstock — *Handbook of Nature Study*, p. 22.

as large now as herself, tugs out earthworms and places bits of them in the young robins' bills while they flutter with delight. Twenty-five yards back of the house, a wild young rabbit is feeding on clover and watching out for cats. In front, the maple trees have been attacked by woolly aphids. The ants are streaming up and down, tending these white "cows" of theirs — and we are considering what we can do to wipe out the pests.

But we can appeal to the instincts of children, too. Perhaps imitation is the strongest. In no other subject, probably, is enthusiasm so contagious, and an enthusiastic teacher so much of a necessity. Here seems to be the explanation of the fact that the best teachers of nature study are the most self-trained.

The instinct for action finds its outlet in our walks, in gathering specimens, in drawing and photographing, in building cages or aquariums, in gardening, and in caring for plants and pets.

Curiosity is a powerful motive. Many a lesson can be started with "I wonder —." If children are inquisitive as to what Mother keeps in her bureau drawers, they may be more so as to what Mother Nature keeps in her secret places.

Self-assertion, good-natured rivalry, will do no harm, even if it sometimes takes the form of "I know something you don't know!" "Who can find the first of this or that?" We enter his name on our bird record, or flower calendar, and behold, his fame is like that of the discoverer of radium or of oxygen.

The herd instinct, too, finds its place. Children even beseech their teachers, sometimes, to form a club. The Boy Scouts' organization is one of the greatest clubs on earth.

In fact, there is no instinct — even the parental — that cannot be brought to serve this cause. Children feel for a baby pet, I believe, a little of what they will some day feel for their own children; and many a thoughtless boy has learned, from a wise parent or teacher, to cherish and sustain all pregnant mothers.

Some killers of interest. — Nature study, as a subject, is always alive; but the method or the teacher may not be. Experts have listed,[1] as among the chief danger points, a poor teacher, especially one who is uninterested; dead work; that is, work characterized by insignificant or trivial observations, with no animating purpose to teach something valuable; too much terminology; nature faking — the substitution of sentiment and imaginative gush in place of fact, though this should not bar out a wholesome literary treatment of our subject — a slavish dependence on books, and the overuse of outlines. The one indispensable factor is a teacher with scientific enthusiasm; for a scientist, a real one, is no such bloodless mummy as certain little scientists have sometimes depicted him to be.

Exercise. — Perhaps we cannot do better than to outline, in a suggestive way, the treatment of some common topic. Let it be Birds, and let our object be to know the common birds so as to deal with them according to their deserts. Here, for example, is a sparrow of some kind: should it have protection or destruction? We shall want to learn the songs of the birds, about their appearance, their common names, and something of their habits, so that we can judge of their value to us.

If it is spring, we can keep a calendar of the appearance of the birds, with the names of their discoverers; if it is

[1] Coulter and Patterson — *Practical Nature Study*, Ch. IV.

autumn, we can keep a calendar of their disappearance (though this is more difficult), or make a collection of nests. A good plan for any particular lesson is (1) a talk by the teacher, (2) field work if possible, and (3) after-exercises of various kinds to fix the bonds.

The teacher's talk is sneered at by some as a mere peddling of second hand information — and so it may be. But most of the information in the world is second hand, or third hand, or x hand, and our best teachers are frequently worth-while talkers. Sometimes one may have luck enough to call in a bird specialist with his projection lantern. Some classes may be in a location where they can visit museums or collections. Or we may draw on the school museum for specimens; and, if there is no school museum, we can begin collecting for one. If even a single specimen is obtainable, we can leave it where all the pupils will have a chance, at their leisure, to examine it. Lacking even this, we can fall back on charts and pictures[1] and blackboard drawings, taking care that they shall not mislead as to size. Perhaps we can have a canary in the room for a time. Any form of bird life helps. One class kept a hen sitting under the teacher's desk and watched the hatching process.

The field trip gives us a chance to use the tandem method; to initiate the pupils into the study of nature as the teacher enjoys it. Sometimes it gives the pupils a chance to initiate the teacher into the practice of freedom as *they* enjoy it. We can prepare against unsatisfactory results by letting the pupils know in advance that certain things are expected (perhaps notebook results), and by letting them find that those who violate their privileges cannot take passage on

[1] Good bird material, including pictures, can be obtained from the National Association of Audubon Societies, New York City.

such trips. The teacher is wise who makes a preliminary excursion alone over the route, and who does not, as a rule, attempt a "personally conducted tour" with more than twenty pupils. The "tour," however, may be as short in time as ten minutes. Miss Comstock tells of an energetic teacher whose class studied all the common plants and trees in the vicinity of her school simply by means of brief recess excursions. Sketching is a valuable part of all such work; not for the sake of the sketch, of course, but to show what "gets through" from eyes to fingers.[1]

The after-exercises may consist of coloring bird outlines (perhaps hektographed by the teacher), using a colored picture as a model; of freehand drawing or written work, or both; of games of various description, such as that of identifying birds whose pictures are shown; of feeding the birds, especially in winter; of making bird houses, reading literature about birds, solving arithmetic problems based on their consumption of insects, etc., the celebration of bird day, and the forming and conducting of a bird club.

Effect. — Life craft, when taught to those who are ready to learn it, should be, like virtue, its own reward; for it means more life. Now some of our school work, it is to be feared, means more death. Some budding spring twigs were given to two groups of children, and all were asked to sketch what they saw. One group was just entering school, at the average age of six. The children of the other group had been in school six years (but had had no nature study). When an outsider was asked to separate the good drawings from the

[1] From the Boy Scouts of America, New York City, one can get copies of a form which makes possible very rapid field work with birds, the identification process following at leisure. Of course this is often highly desirable.

bad, he did so with ease. It was then found that all the drawings which showed keen observation of essential features and free expression of them on paper, had been made by the unspoiled six-year-olds. Drawings from the other group were stiff and conventional, and notable for the omission of conspicuous features. The twelve-year-olds "had become apparently so dependent upon outside authority as represented by teachers and books that when left alone they were at sea with neither chart nor compass."[1]

We know what "two-fisted" means; we want to make our pupil two-eyed, so that he will see straight no matter how many others see crooked; and we want him to be independent and self-reliant, so that he will have no cringing fear of his environment, but courageously do what needs to be done.

A man went down to Panama,
Where many a man had died,
To slit the sliding mountains
And lift the eternal tide.
A man stood up in Panama,
And the mountains stood aside.

If our pupil feels that he is becoming a real practico in pragmatics, he will not fail to "carry on."

Tests. — In a large part of life craft, the doing of the work is the test. If a child can tie a knot that will hold, or give clear directions as to how to go from his schoolhouse to X, some miles distant, or build a bird house that birds are willing to live in, or raise beans where weeds grew before, he "passes" *ipso facto*.

The more petty kind of test, machine made and graduated down to millimeters, has fortunately been slow to make

[1] Coulter and Patterson — *Practical Nature Study*, p. 20.

its way in this subject.[1] Besides, there are undoubtedly large portions of it which ought not to be examined for growth too soon after it is implanted. The fact that the child's sensory nerves keep well ahead of his motor nerves in development should give us our cue for a great deal of what we do. Power to understand and appreciate runs away ahead of the power to express. Myriads of facts should be presented to his eager mind by talk and walk and brook and book and by every other means, and should never be asked for again. But they will all have their effect. The soul must have time and materials in order to develop.

CLASS EXERCISE

Let each prepare some simple life craft lesson — preferably one with an immediate practical application — and give it to the class as to a group of children, providing such apparatus as may be necessary.

The following are suggestions: Tying up a package (breaking the string, etc.). How to plant a seed of some kind (box with one glass side may be used). The use of a lever (may be applied under the edge of the teacher's desk, with simple fulcrum). Behavior of stale eggs and fresh ones in water. Melting point of butter and of oleomargarine. How a lock works (shown by dissecting one). Diagram of best way to cross a street (at corner only, and not diagonally). How to apply a bandage.

If any boy or girl with a hobby can be found, he or she may be induced to give a demonstration before the class, as if for a group of schoolmates.

[1] Those who wish to read of a start in this direction will find it in Chapter X of *The Gary Public Schools: Science Teaching*, published by the General Education Board, New York City.

FOR FURTHER STUDY

1. What is the difference, as you see it, between nature study and elementary science? What idea does life craft add to both?

2. Why should no one branch be central in the curriculum of all children? But is there any child who, especially as he matures, should not have some one branch that becomes central for him?

3. Why is a girl usually so helpless if anything goes wrong with her roller skates, or bicycle, a window blind, the lock of a door, etc.? What can be done to help this condition?

4. Try to list some further bonds that you think should be taught, under each of Spencer's five classes of knowledge that is of most worth.

5. In certain schools, to forward the teaching of elementary science (or life craft), a "helper" is sent from a lower grade to a higher one to learn by helping, and an "assistant" from a higher grade to a lower one to learn by showing. Comment on the good and bad points of this plan, as you see them.

6. Some teachers emphasize having the pupils work in groups in nature study and similar branches, while others lay stress on individual achievement. Which plan does your experience, reading, etc., lead you to favor? Or is one plan suited to one purpose, the other to another?

7. Give examples of your own to show that consecutive observations of natural processes, such as the growth of seeds or plants, must lead to the forming of bonds in series, and perhaps to the appreciation of cause and effect.

8. "They can be brought to see that a ball, and a stream of water, and a ray of light, and many other things, all 'glance' in the same way from a surface that turns them back." What advantage is there in forming such trunk line bonds as that? Can you give other examples of such bonds?

9. Tell what you would do in the way of securing *readiness*, *exercise*, and *effect* if you were giving a lesson on the pet rabbit; the honey bee; forest fires; some garden weed or weeds; cooking an egg; how a burning glass "draws fire from the sun"; how a bicycle pump works.

10. Show how a teacher can make use of nature study as a means to health and recreation.

11. To what extent would you encourage or permit a pupil to "let his imagination run" in the study of things in nature? Why?

12. Do you think children are more interested in what a thing *is*, or what it *does*, or what they *can do with it?* How should this influence our teaching?

13. Show how life craft can be correlated with other branches of study; as reading, writing, drawing, arithmetic, language, local geography, primary handwork, and manual training.

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CHAPTER XII

Drawing: Elementary Graphic Expression and Beauty Craft

Exercises. — 1. List as many different situations as you can think of — actual life situations of a common kind — in which power to draw gives either a practical advantage, or pleasure, or both. List also common situations in which artistic taste is desirable, as in choosing harmonious colors or designs in clothing or wall paper.

2. You want your pupils to be able to draw a robin in characteristic pose. They may either observe the live bird or a stuffed specimen. There are numerous pictures of robins, and you can easily hektograph the typical robin form. What would you do in order to stamp the form of the robin on their minds and have it expressed by pencil (or crayon or brush)? In particular, would you direct, or permit them, to trace from a picture, copy a picture, trace the form in the air with a finger, cut out the hektographed form and mark around it, follow you line by line as you drew a robin on the board, or draw many robins (especially in the same poses) before drawing other birds? Why or why not?

A first word to the teacher. — Perhaps your heart fails you as you approach this subject. Artists are born, not manufactured — and can anyone but an artist teach art? The positive and decisive answer is, *Yes*. *Practicing* an art is one thing, and *teaching* it is another and very different matter. The essentials in teaching are personality plus pedagogy. With these, and "a liking for drawing" and a willingness to work, many a teacher has beaten the artist in presenting to children his own specialty. If drawing "comes

hard" for you, even that burden may be made a blessing; for you will know so much the better how to make it easy for others.

So, if you will furnish the personality, we will proceed with good cheer to develop the pedagogy.

Drawing: graphic art. — Drawing is a *language*, and drawing is a *joy*.

As the language of the hand, it enables us to express things which can be told better in a drawing than they can in words. You do not write out a description of your absent friend and put it where you will read it often; you want a photograph (a light-drawing) or a good sketch or a water color, placed where it will frequently recall him or her at a glance. You do not so much want a verbal description of a horse fair; you want Rosa Bonheur's picture of it. When anyone is especially apt in using words so as to call up vivid and beautiful visions in our minds, we call him a "word painter" — a fine compliment both to him and to painting. But the graphic art has its more homely uses. Perhaps you are one of those delightful letter writers who illustrate their letters with sketches. Or you may draw for the milliner the hat you want her to contrive; or for the smith or carpenter the peculiar iron or block you want him to shape; or for your friend the mechanical device you want him to understand, or the road map he is to follow. If you are teaching, seldom a day will pass but that you will have on your board some drawing to help you explain things to the children. "Drawing," said a little girl, "is thinking, and then marking a line round the think." And she hit it pretty well.

But drawing is also a joy. Even the cave men knew that, for they drew and colored many beauty pieces which

were not at all needed if the only purpose was to pass an idea from mind to mind. We love to live again through that which brought us bliss, from a good picnic dinner to a moonlight love scene, or to the yearning of the soul that feels the mystic clasp of its Creator.

> Let Fate do her worst, there are relics of joy,
> Bright dreams of the past which she cannot destroy.

"To dream the old dreams over is a luxury divine" for all of us. The poet puts his dream into words, and the artist his into form and color. Sometimes an idea is so beloved and so meaningful that it is repeated limitless times in design, on floors or in borders or capitals or friezes, as the lotus flower among the Egyptians, or geometrical forms among the mathematically minded Greeks. And it is not only memory that gets itself bodied forth in this way. Imagination also bursts forth into expressive form to show us what the world might be if it were not as it is. A little boy was told not to draw a chicken with blue crayon because chickens never are blue. Said he, "If you will let me have the crayon, I'll show you how a chicken would look if it was blue." [1]

Beauty craft. — If you will glance around the room where you sit, you will get a sample of beauty craft or the lack of it. The walls are attractively colored or they are not; there are pictures or there are none; and if pictures, they please or repel. Not far away, perhaps, a man has built an ugly house. He ought to have had a little training in beauty craft before he left the public school.

In this world, we all have a chance to appreciate a momentous amount, and to choose a great deal, and to *create*

[1] Sargent and Miller — *How Children Learn to Draw*, p. 169.

at least a little. This appreciating and choosing and creating of beauty is beauty craft. Which moving picture shall we approve, and why? Which Sunday supplement? Which magazine cover? Yes, and which advertisement? It is hard to tell, sometimes, where beauty leaves off and lewdness or ribaldry or a cheap commercialism begins. How shall we contrive to combine our clothing into a harmony with our personality? How make hat and head agree in what they tell to the world? Given a little ground around our dwelling, what shall we create there? New York City's beautiful Central Park was not born of nature, but made by man, and made largely from a barren waste. "Laying out grounds may be considered a liberal art," says Wordsworth, "in some sort like poetry and painting."

Beauty craft will help us, in some small or great way, to increase every day the sum of the world's beauty.

What bonds do we want to form? — We have already learned what bonds we want to form, and need only summarize.

1. Under the stimulus of "something to tell" or "something to feel," we want the response of picturing it on paper (or other medium), so that those for whom it is intended will catch the meaning or the feeling.

This means that the pupil must be able to draw many things in nature, from leaves to landscapes; to draw constructed objects, from toys to temples; to represent the figures of animals and perhaps humans; to do lettering; to make designs; to control colors.

2. In any situation where the question is one of beauty or ugliness, harmony or discord, we want our pupils to respond by appreciating, choosing, creating the beautiful and harmonious.

Of course all these things are to be done according to the ability of childhood. We are not trying to make the children into little old men or women, nor into little old artists.

Our pupil will need to acquire beauty standards for landscapes, both natural and artificial, for lawns and gardens and other house-surroundings, for dwellings themselves, and for the architecture of town and country, for sculpture and pictures, for all dress and adornment. Surely this is a big program, but it means an omnipresent opportunity to do good. Any teacher who can tactfully influence a boy to stop wearing a red necktie over a purple shirt, or induce a girl to stop doing her hair unbecomingly, has scored a big stroke for beauty craft.

What responses can the child make already? — Perhaps the Binet tests will help us to find what responses the child can make at the start. At three, a normal child points to and names familiar objects seen in a picture. By the time he enters school at six, he can tell which is the longer of two nearly equal lines, pick out from a number of geometrical figures the one that is like a sample shown him, copy a square fairly well, name the more common colors when he sees them, tell a pretty face from an ugly one when they are pictured, put two pasteboard right triangles together so as to form a rectangle, tell the right parts of his body from the left parts, and discover what is lacking in an incomplete human face or figure (as when an eye or an arm is omitted from a drawing). At seven, he can copy a diamond-shaped figure, and he also recognizes the action in a picture — "the little girl is crying," etc. When eight or nine, he "explains" a picture, infers what it is all about: "the little girl is crying because the cat has eaten all the milk," etc. At ten or eleven, he performs the remarkable feat of looking, for ten

seconds, at two rather complex designs (there are twelve or thirteen symmetrically arranged straight lines in each) and then reproducing both from memory.

Scribble drawing. — Children of the first grade are notorious wielders of pencil and crayon — and the first results are likely to be notorious, too. Figure 26 shows two typical drawings of a sparrow, made before any instruction had been given. But the splendid thing about this first grade spirit

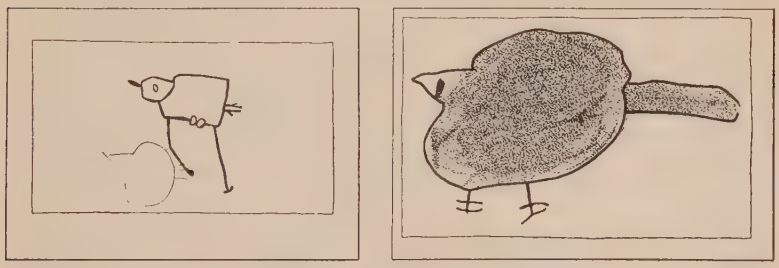

FIG. 26. Average drawings of a sparrow, made by first grade children before any instruction had been given. (From Sargent and Miller's *How Children Learn to Draw*, p. 121. Ginn and Company.)

is its dauntlessness: it will level its pencil at any subject suggested and straightway have a joust or two. If there has been any help at home (take this up in your parent-teacher meeting), we may find our budding artists really quite skilful in the drawing of one or two or a few subjects, and we must let them show their mates "just how to draw a" — whatever it is.

Are there any marks of graphic ability? — Manuel's study[1] indicates that talent (a high degree of ability) in drawing has little to do with general intelligence, or lin-

[1] Herschel T. Manuel — *Talent in Drawing*. Public School Publishing Company.

guistic ability, or general motor superiority, or even with achievement in handwriting. The one who draws well is likely to be a keen observer (especially with his eyes), apt at picking out the striking and beautiful aspects of things. He can usually hold in mind what he has seen, and can turn it over and shift it about mentally without confusion. He can discriminate small differences in size and color, is a good judge of the beautiful, and is quick at selecting old forms and figures and combining them into new and beautiful compositions.

Interest may indicate either talent or a high development of ordinary ability, and "is of immense practical importance as an index of the energy which one is willing to expend in the development of one's ability and in practical achievement."

"What previous responses will help with this lesson?"— The teacher should consider previous responses whenever she puts pencil to lesson plan. Drawing serves all other branches, but it has also a continuity of its own. If you have drawn a robin, you can go a long way toward drawing a crow — or almost any other bird. The Indian wigwam prepares for the tent of the Arab. Water is water and maples are maples, no matter in what composition they occur. The children will often discover these old elements in their new projects, and the teacher can help them discover still more. One very skilful teacher has her pupils sketch the outline of an egg as a means to drawing a bird, then building on the head and tail and wing, and starting the legs "away back" and coming forward (toward the head) with them before putting on the feet. I find I can teach my students to draw a brain by showing them that it looks like a boxing glove.

It is also a plan approved by experts to let children undertake, without previous instruction, the drawing of something in which they are interested and which they are to study later more fully, and find what responses are called forth. If the drawings are done on the board, or otherwise brought before the children so that they can jointly and severally offer criticisms and suggestions for making improvements, the exercise ranks as one of the most valuable; for it causes each to note what he lacks and how he can make good the lack.

Relation of the desired bonds. — The bonds necessary in drawing are related in every way. When we add line upon line till some simple form is outlined, we have bonds in series. When we draw a box above the level of the eye, at eye level, and then below eye level, we form a trunk line bond which will help us in the drawing of any box-like object (such as a house) in such positions. And when we put a number of well-mastered objects together — wigwam, fire, canoe, and lake — to form a new picture, as we do in pictorial composition, we are working with inclusive units.

Herein lies the undoing of many a teacher of drawing: she introduces too many difficulties at a time. Quite commonly, too, she regards art as some mysterious sort of soul expression, and fails to begin with the humble sensori-motor side of it.

Beginning with sensori-motor bonds. — In the last chapter was quoted a case in which unspoiled children looked with honest eyes and drew with honest pencils what they saw. That native simplicity should be encouraged. The first failure is often in the looking. Before you can "think a thought and mark a line around it," you must make that

thought very clear and vivid, and the way to do that is to look before you let your pencil leap.

Agassiz used to say that a pencil is the best of eyes, meaning that one must look carefully before he can draw definitely. That great naturalist and teacher once left a student with only a fish and a pencil for three days of study. The student afterward said it was the best lesson in zoology he ever had — and very likely it was the best lesson he ever had in drawing, too.

Nor is sight the only sense to use in the development of drawing. Although pupils can not hear much of what they are to picture by drawing, nor smell it, nor taste it, they can touch it, move it, run their hands along its outlines, mold it, build it, trace it in the air, cut its form from paper with guide lines or without, trace it, copy it, mark around a paper cutting of it, and so on. If "it" is a person (perhaps in a painting), they often get a great deal of help by acting or posing like that person, and seeing others do so. In this way they "catch the spirit" of what is to be expressed.

One difficulty at a time. — The one big idea to grasp as a guide to introducing but one difficulty at a time is that of a *graphic vocabulary*. In order to talk fluently, we must have a vocabulary of words, that is, a stock of words that we have used until we can use them easily. In order to draw fluently, we must have a vocabulary of graphic units, that is, of things we have drawn until we can draw them easily. In the old days, this graphic vocabulary consisted of point, straight line, curved line, triangle, square, etc., on which the pupil practiced until he could make them all very prettily. Then he took up the various solids — cube, cone, and the rest — and studied them in different positions; above the eye, below the eye, to right, to left, and so on. When his graphic vocabulary

was complete, he was ready to draw anything in any position: a tower was just a cylinder with some extra fixing on top, a tree or a fire was a cone with variations, and a chicken coop was a triangular prism. For an interested adult who is ready to undergo any kind of drubbing in order to master the graphic art, this is not a bad way to learn it — though it tends to make one a bit stiff and mechanical in his work. But children are like those students of music who, on beginning the violin or the piano, want to play a tune right away. We must build up a different kind of graphic vocabulary in working with children than we would in working with adults.

How to build the graphic vocabulary of children. — We do this by fixing first the bonds that are easiest and most interesting, that occur most frequently, and that prepare the way for the greatest number of bonds-to-be.

There is no one way by which drawing must be started, no one kind of subject that must be drawn first. But we are not likely to get through even the first grade without taking up the principal parts of landscapes — mountains, hills, plains, rivers, lakes, and trees. How many types of tree are there? Only three in the drawing class, the deciduous (with or without leaves), the evergreen, and the tropical (such as the palm), with its curving branches at the top. A child who has drawn these three until he can execute them easily and quickly, so that they have become a part of his graphic vocabulary, will be able to make at least a fair representation of any tree that grows. (Of course we shall not force upon him any type to which his limited experience has not yet introduced him.) The same is true of mountains. Here again there are but three types, "the volcano, the low-rolling mountain, and the jagged rocky mountain." [1] With

[1] Sargent and Miller — *How Children Learn to Draw*, p. 78.

these three trunk line bonds fixed, variations can be introduced.

In undertaking any special field of illustration — such as that of Indian life — teacher, or pupils, or both, should make an inventory of the graphic units likely to be needed — wigwam, trees, canoe, etc. — and make each familiar (if it has not been studied before) by suitable exercises.

Is there a complete graphic vocabulary? — We need not worry too much about graphic vocabulary, any more than we would about mastering all the words in the dictionary. By turning back (in this chapter) to "What bonds do we want to form?" we can readily discover what is necessary to a good working graphic vocabulary. It should include typical samples of (1) natural objects such as trees and smaller plants, (2) the elements of the landscape, (3) constructed objects with straight and curved lines, (4) animal and perhaps human figures, and (5) simple geometrical forms for lettering and designing. And just as there must be practice in putting words into sentences, so there must be practice, from time to time, in combining these graphic units into pictorial compositions. For example, if a child has mastered, as a part of his graphic vocabulary, tent, tree, boat, and lake, he may be asked to illustrate a story about a camping trip.

The artist speaks in words of color. Our units of expression should, from the very start, in the first grade, include color. Crayons are usually employed at first, though some use water color from the beginning. But in grade four or thereabout the average pupil sloughs off his old ways and takes on new ones — or tries to. He wants his work more truthful, accurate, harmonious than before, both in picturing and in designing — especially in decorative designing.

Many teachers like to seize this opportunity for introducing water colors.

In grade six, we can disclose a little, at least, of the mysteries of perspective; and in the following grade, the elements of the theory of color[1] and of design.

One difficulty at a time in beauty study. — What *is* beauty? It is the experience we have, I take it, when all our nerve cells, or about all that are active at the time, are working in harmony and not in conflict. And that is beautiful, or has beauty (using the word now to refer to objects and situations) which can bring about such a result. A pig lying in a puddle, muddy water on one side and sun shining on the other, must enjoy beauty to the pig limit. So does a boy (to the boy limit) in a tree of ripe cherries. Evidently, there are many grades and individual variations in this matter of beauty. One great trouble with our "Picture Study" and "Art Appreciation" in school courses has been that we were too determined to make children find beauty in what seemed beautiful to us — or at least what we are supposed and expected to find beauty in if we lay claim to culture. We introduce too many difficulties at a time. As a boy may begin, in books, with the yellow-back and gradually work up to those of blue blood, so he may begin in beauty with the gaudy show bill and work up, at length, to Millet's *Angelus*.

The problem of Beauty is the problem of Readiness over again. That is beautiful which strikes pleasingly the chord of our instincts, our abilities, and our old habits. If, then, we know what any child likes to play, to read about, to draw — to do in general — we know what is beautiful to him. Look in his scrap book, if he keeps one, and the pic-

[1] A. H. Munsell, in his book, *A Color Notation*, has presented color by a method which might well be adopted by teachers everywhere.

tures there will give you the key to his heart. Or take him to the art museum and let him stay longest in the department he likes best. He takes pleasure, especially at an early age, in the simple recognition of things familiar — a toy, a house, a game; and for years, perhaps, the photograph of the old swimming hole is much more beautiful to him than Corot's landscapes. As the first grade child loves to read stories of animals and of child life, so he enjoys pictures of these things. We owe a great debt to those makers of primary readers who have illustrated their books beautifully, and have warned us that the pictures are to be read as well as the print.

It would be a hazardous matter to lay out an absolutely fixed course in beauty craft, and we should not allow anyone to inflict such a thing upon us. But we shall know what to do at any time with any child if we watch his interests and make our work in beauty craft an expression of these. Teachers of this subject find that special interest on the part of children who have only ordinary ability often causes them to surpass the talented.

Readiness. — Motivation should be very easy in graphic art and beauty craft, for there is scarcely an instinct that we cannot tap — action; manipulation; curiosity to "see how it will look"; play, in pictures at least, and dramatizing the picture; group spirit, as when each draws his part of a picture at the board, or coöperates in some artistic project. We can even assure the pupil that the work "may be worth good money" to him; for many a buyer, designer, architect, cartoonist, landscape gardener, photographer, or other worker in beauty craft is making his living and more by such means. As in penmanship, imitation is a strong means to readiness; to see someone draw

with ease what you are struggling to represent is little short of an inspiration. The teacher who has not learned blackboard sketching should try to add it to her qualifications.

Many teachers are coming to believe that the strongest motive of all in the teaching of drawing is the story-telling motive. The "story" may be taken from any other subject, as reading, history, language, or geography. Naturally, we shall take whatever theme we find our pupils most enthusiastic about, if it fits in at all well with the course in drawing. And it seems quite possible to teach most of what is really necessary in drawing by following judiciously the lead of these "stories" that are pushing for expression. For example, both nature study and the graphic art take on a new interest when the pupil can picture with his pencil, from time to time, some phases in the life of his pet animal or the growth of his pet plant.

Devices help, too. The camera, and perhaps the stereoscope and stereopticon and moving picture, should aid in the study and choice and creation of beauty; and that teacher will be blessed by many of her pupils who will show them how, by looking with one eye through a one-inch by two-inch opening cut in a three-inch by five-inch card, to find beautiful pictures scattered over various portions of the landscape.

Some killers of interest. — One great difficulty comes from the teaching of bonds that are useless or out of place. Many names and rules and definitions are of this type. Such word-bonds have little to do with artistic execution. What we want are observation and action. Too much detail, as in the dry description of pictures or the retailing of lives of artists, is also a weariness to pupil flesh.

Another blunder lies in traditionalism — doing only what is commonly done and leaving all else undone. Why forbid the use of ruler and eraser? Mass drawing (filling in an area without first drawing the outline) and "blocking in" (fixing the extreme points of a group of objects and connecting them as if by a string drawn round them before drawing the objects) are methods that seem unsuited to children; but they profit by copying and tracing and taking dictation line by line from the teacher, and why should they not do so? These methods do not kill originality or spontaneity, but rather furnish a soil for them to grow in.[1]

Of course the monotonous is always out of place. "I am tired of tomato soup and Madonnas!" said a little girl. She had found one at home and the other at school for too many days at a time. But children do not tire so soon of their own choices, and they can often help to choose.

Exercise. — Let us take a sample topic. Let us suppose the pupils, through nature study, have become so interested in birds that they wish to tell bird stories by drawing.

The essentials in any such project are three:

1. Purpose
2. Materials
3. Practice

All three are very frequently neglected, so that many pupils do not know just what it is they are trying to do, nor do they see enough forms (pictures) of the general

[1] It will generally be found that when the instructor, casting aside the traditions of the art school and the methods which the adult uses readily, will frankly accept the method natural to the children and will utilize its particular possibilities, good results will be speedily obtained. — Sargent and Miller. *Op. cit.*, p. 180.

kind they are going to make, nor do they have practice enough on any one form to fix it as a unit in their graphic vocabulary.

Discussion clears up the first — discussion stimulated by very definite questions. "What is the bird doing?" If any similar birds have already been drawn, let us review their shapes.

The children may have their own independent trial first — on the sparrow, say (producing results like those of Figure 26). Class criticism is then in order, each child, or at least several, placing his drawing before the class while the teacher asks just what can be done to make it better. It is often found that such class criticism is more helpful than that of the teacher.

There is now a dawning ideal and a consciousness of need. Further materials are wanted — a new look at the birds, a view of stuffed specimens, pictures showing how sparrows have been put on paper by other people. The school museum should accumulate collections of pictures, classified, so that material can be found on many subjects, from the sculpture of the ancient Greeks to the life of the "little frosty Eskimo." Older children will collect notes on these things, in the form of sketches.

A hektographed bird can be given out, to be traced (look out for good hand position and pencil holding). Turning the tracing paper over gives us a second view of the sparrow. (See *B* and *C* in Figure 27.) After several tracings, the bird may be cut out, and other freehand cuttings made.

Perhaps we shall next trace the form in the air, or hold the hand so as to indicate the slant of certain lines, or lay sticks to outline the form. The teacher may then dictate the

form, adding line after line, the children following. (See Figure 27.) Perhaps she will draw several sparrows on paper like that used by the pupils, then throw them away. Color, if wanted, can be laid on after the pencil work is done. Later, the children will draw the subject from memory.

We may not always go through just this series of steps; but we shall go through some series of steps that will impress thoroughly the form to be drawn, and which approaches the tandem method in giving guidance and preventing errors.

Suggestions as to beauty craft. — One of the best approaches to the study of pictures is through the project of making pictures. We want to draw a tree. "How did Rosa Bonheur draw trees?" And the same with other subjects. We have more respect for the work of the artist when we see what we ourselves can do.

Often the picture or other beauty piece can be left to do its perfect work by simply being placed in the schoolroom. Some teachers have a beauty corner and get the pupils to "watch this space," for there appears one æsthetic specimen after another — a shell, a bird, a sewing sample, a box, a picture. Suitable pictures can be obtained "for a song" and used to illustrate work in reading, history, language, geography, nature study. Sometimes we can get quite a rush of beauty feeling by a double process, such as exposing a picture of Spring and at the same time singing the "Spring Song."

We must make this subject of beauty craft as useful as we can. We may go about town (tactfully, of course) passing our judgment on architecture and parks and the laying out of streets, and chasing ugliness as the Dutch chase dirt. We may take up, especially in connection with color, the

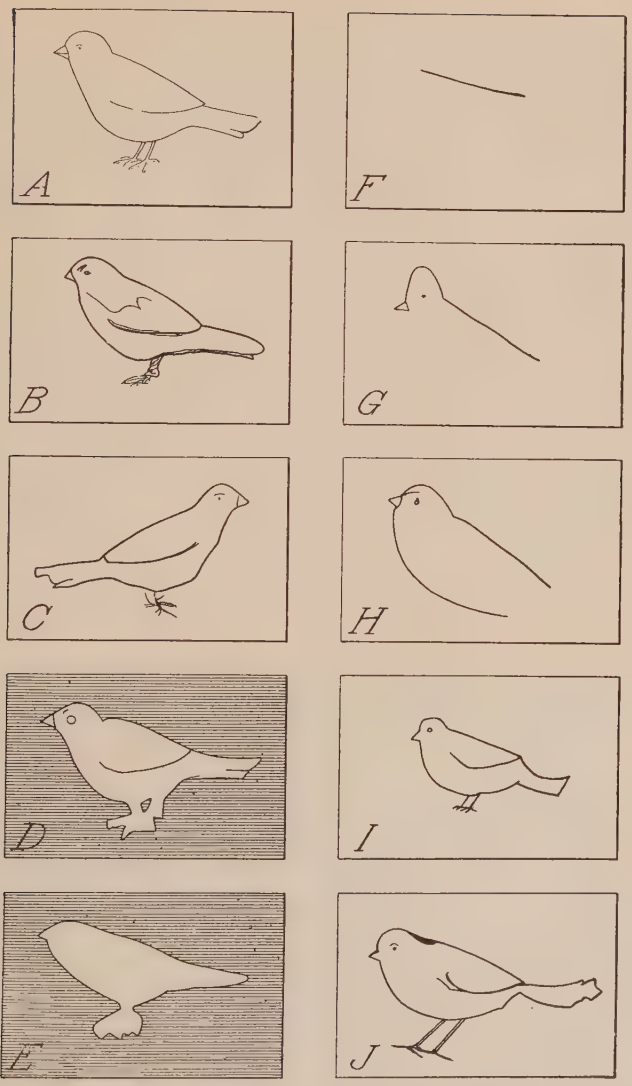

FIG. 27. Successive steps in learning to draw a sparrow. (From Sargent and Miller's *How Children Learn to Draw*, p. 121. Ginn and Company.)

choice of clothing, of wall papers and borders, of all that we hang on our figures or surround ourselves with. And this is about the only subject in the elementary school in which we have such an opportunity.

Effect. — The grand effect is that of "There! I've done it, and it's good." It is a pleasure like that of the Creator, who looked upon his work and pronounced it good.

There are, of course, the general conditions to be checked up. Is the environment artistic, at home and at school and about the neighborhood? Is our pupil in good condition, or has he no energy left with which to feel the thrill of beauty? Has the teacher any contagious enthusiasm? Is the drawing a natural expression of the pupil's interests, or does the teacher (as a pupil of mine expressed it) "stick up something in the front of the room and say, 'Now draw that' "? Is there a suitable special stimulus for each lesson? And are the pupils guided and practiced on appropriate work by the tandem method until they can produce something satisfying?

When these conditions are carefully attended to, even children of moderate ability, finding that they can do what they had supposed to be away beyond them, often work with such a will that they equal the talented. Their increased willingness to attack future tasks is a real gain.

Testing essential bonds. — The graphic art and beauty craft do not lend themselves so readily to finely standardized tests as do the more mechanical branches. But definite teaching welcomes definite testing. We can ask for reproductions, by memory or otherwise, of the units of the graphic vocabulary we have taught, and we can require reasonable recombinations of these old forms into new pictorial compositions.

An attempt to introduce standardized measurements into the subject appears in Thorndike's drawing scale.[1] In Sargent and Miller's excellent book appears a chapter on "Interests and Standards of Attainment" — very practical and helpful.

CLASS EXERCISE

Let each prepare a very brief lesson in drawing or beauty craft to be given to the class as if to a group of children. Any simple subject may be taken — a flower, a hill, a toy, lettering or designing. Not all the steps outlined in this chapter need be taken, but enough should be presented to show how the work is planned.

Some may present a sample of picture study, with so much about picture and artist as is thought suitable. Perhaps others will be able to introduce color harmony in wall paper, clothing, etc., or give at least a fragment of a lesson involving perspective.

FOR FURTHER STUDY

1. Do you think that having children copy and trace, dictating to them line by line, etc., will suppress their originality or free expressiveness? Why or why not?

2. How do you explain Manuel's findings, that talent in drawing has little to do with general intelligence, linguistic ability, general motor superiority, or achievement in handwriting?

3. How comes it that an artist can paint one kind of subject well, but usually not all kinds?

4. If you have an illustrated picture catalog, how can you find which pictures are best to order for your school?

5. How were you taught drawing? Do you approve the method? Why or why not?

[1] Obtainable from the Publication Office of Teachers College, Columbia University, New York City.

6. Make a list of things which you think should be taught as a part of the graphic vocabulary of a child who wants to illustrate stories of colonial life.

7. Tell, in general, how you would teach a child to do good lettering.

8. What is probably the most beautiful thing that a dog ever sees — that is, beautiful to the dog's eye? That a ten-year-old girl sees? A lover? A sailor? Why is this?

9. Why is the same person or scene sometimes pronounced ugly by one and beautiful by another?

10. How should the work of this chapter be related to that described in Chapter VIII, on Construction Work? Show how the two lines of activity can be correlated.

11. Teachers of drawing find that a favorite subject, such as the wild rose, is drawn and redrawn many times for the sheer pleasure of it. What has this fact to do with the teaching of design, the selection of subjects for borders, decorations, etc.?

12. It is often found that a child who does not succeed well in drawing objects in good proportion is helped more by a few exercises in very definite geometrical figure drawing than by prolonged practice with objects. Why is this?

13. What do you think of the plan of giving children hektographed copies of a picture that is only partly drawn, with suggestions as to filling in the remainder? Why?

14. Select any common object whose drawing might well be made a unit in children's graphic vocabulary, and tell how you would deal with Purpose, Materials, and Practice in the study of it.

15. Tell some things parents can do at home to forward the study of graphic art and beauty craft.

16. What pictures did you most like when you were a child? Why was this? How, if at all, would you change your childhood experience with pictures?

17. Give some ways of correlating drawing with other subjects.

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CHAPTER XIII

Composition and Elementary Grammar

Exercise. — Suppose you are in some foreign country — France, let us say. You know something, but not much, of French life and ways, and you have learned a little, but only a little, of the French language. As you have imitated the talk of the street, your speech is full of errors. Please grant also that you have a preference for gutter French as it falls from the lips of your cronies, and feel embarrassed and somewhat ashamed of yourself when circumstances compel you to adopt the correct and elegant kind.

You have a teacher of French whose aim is to have you express yourself in good French whenever you speak or write. You speak a great deal and write a little, especially letters. What would you advise him to do in order to secure Readiness, Exercise, and Effect in your nerve cells? In particular, what exercises should he spend most time on, and in what order? Outline the method and indicate the kind of exercises you would like to be put through.

What is composition? — Suppose we look up the word in the dictionary. *Com* means *with*, or *together;* and the rest of the word means *putting*, or *placing*. Composition is simply putting things together. The chef composes a fine salad for us by putting together tomatoes and lettuce and cucumbers and dressing; and the salad is *composed of* these things. The bricklayer composes a brick house by putting bricks together. The artist, as we have seen, has his pictorial composition: he puts together lines and colors from his graphic vocabulary and composes a picture. The musician has his musical composition: he puts together tones, which are the

units of his musical vocabulary, and composes a tune. The professional dancer puts together steps and trips and skips, which are the units of her dancing vocabulary, and composes a new caracole or gambado. We compose in language when we put together the units of our verbal vocabulary — that is, words — to tell what is in our minds, express our ideas and feelings.

Just as we speak of drawing and related art as graphic expression, so we might well speak of composition as verbal expression, that is, expression in words.

Whence came grammar? — Our old cave-man ancestors talked a great deal and did some drawing, but had no written language and no grammar. Later, when written language had become fixed and spoken language went on changing, it became necessary to have rules and other helps to tell what the old writings meant. You know how many disagreements have grown out of different interpretations of the Bible even to-day.[1] So, several centuries before Christ, the Hindus in order to preserve the sacred meaning of their sacred books, and the Greeks in order to preserve, intact, the written teachings of their philosophers, worked out the rules which their revered writers had apparently followed; and these sets of rules were grammar. When the language had become standardized in this way, other writers felt that they should keep to the same standards. Grammar became so important that it was regarded as the very "source and foundation" of the seven liberal arts of the middle ages, itself being the first of the seven. "Grammar," said a lead-

[1] What does it mean to you when you read, in Psalms 88: 13, "In the morning shall my prayer prevent Thee," or in Psalms 119: 147, "I prevented the dawning of the morning, and cried"? If you have had even a little Latin, you know that "prevent" means "come before."

ing writer of that time,[1] "is the science which teaches us to explain the poets and historians; it is the art which qualifies us to write and speak correctly." He urged that it be taught in every Christian school.

We must remember that in those days there was no such thing as a dictionary as we know it. Grammar included the study of sounds and letters, syllables and words, sentences and figures of speech. One who studies a modern spelling book or dictionary is studying what was then grammar. For a long time the subject has been shrinking, and yet for a long time we have gone on teaching it as if it were as important as ever.

What is grammar? — The study of grammar, as we know it, is hardly necessary to teach us to understand our present-day writers. If we see the words "eye" and "glass" together, we can usually tell without any difficulty whether the hero had a glass eye or an eyeglass. And as for speaking and writing correctly, one of my college professors, who had never studied English grammar at all, lectured fluently and well and wrote several books.

Grammar is simply the rules of the language game as the best players play it. You may do this and you may not do that. Why? Simply because Shakespeare, Milton, Addison, and others have or have not done so. But the "rules" are stated in difficult terms sometimes, terms which date back to antiquity. And further, the rules of the language game, like those of other games, change from time to time. For instance, only a few hundred years ago, it was considered the best of English to use the double negative: "They don't show no honor to no man" meant (as we would say) "They show honor to no man." People of those days

[1] Rhabanus Maurus, in *Education of the Clergy.*

assumed, just as children seem to to-day, that if one negative is strong, two or three must be stronger. Teachers spend many aching hours trying to rid their pupils' speech of such "errors"; and must continue to do so, though many errors of the present will be good English idioms by and by.

Relation of composition and grammar. — Not so many years ago, a chapter like this one would have been called "Grammar and Composition," instead of "Composition and Elementary Grammar"; for it was supposed that, just as one had to learn his Latin grammar before he could do much with the Latin prose composition, so he had to master English grammar before he could do much with English prose composition. Even yet, my students often tell me, "You certainly cannot speak correctly until you have learned the rules for speaking correctly." This is like saying that you cannot play ball until you have committed your rule book to memory. But even the referee has a rule book in his pocket — and excellent players may not be able to put the rules into words.

A group of us once ventured to play football, and early asked the coach about the rules of the game. "Never mind about the rules," said he. "Learn the rules by breaking the rules." This may have been rash advice, but it was his emphatic way of telling us that if we were going to start in by loading up our minds with rules and then apprehensively trying to obey them all, we should never get anywhere with football.

Sensori-motor bonds come first, and high-level rules later.

Children should learn a game by playing the game. They should learn the rules by playing, picking up one new point

at a time. And this holds true of the language game. We have been drawing too sharp a line between composition and grammar. Children should not realize where one leaves off and the other begins. The "rules" should grow naturally out of the "game," and be practiced in one after another as they appear.

Just as nature study and elementary science lead to life craft, and drawing and elementary graphic expression lead to beauty craft, so composition and elementary sentence science lead to word craft — the skilful use of words to attain our ends. Grammar, considered as the technical science of the sentence, has no more place in the elementary school than has any other closely organized science such as physics or chemistry. We should no more separate grammar from composition and teach it as a pure science in the grades than we would separate "elementary science" from nature study and teach that as a pure science, or separate from the study of drawing the abstract principles of art and teach them as a distinct subject in the eighth grade. Organized, abstract science of any kind is not now taught below the high school — or better still, it is taught above the junior high school (ninth grade), where the more mature mind of the student is ready for it. The object of the elementary school is to *do things*, and that requires a different form of organization for what we teach. It is word craft and sentence craft that we want here.

What responses do we want? — The responses we want are those that our pupils will need most in their talking-and-writing future. The chief use most of them will ever make of the language lies in conversation in the family or social circle, over the telephone, in the office, "on the job," or wherever else two or more are so situated that somebody

can talk and somebody listen. So far as earning a living and doing the world's work is concerned, there must be a great deal of *giving and taking of orders and directions* — an exercise in which there should be more practice, perhaps, in our schools. Closely associated with this is the rare art of hearing a story straight and passing it on straight, as we are all expected to do for truth's sake, and as newspaper and business men must do for safety's sake.

The letter is the most common form of written composition, and this is simply a one-sided conversation or business message put on paper. When it comes to wills and contracts and other important documents, we usually employ a lawyer — in other words, a specialist. But everyone should be able to write a news item, or keep the minutes of a meeting, or serve as secretary of any ordinary organization, or set forth simply his views (if he has any) on matters of public interest.

These seem like modest demands. Probably the school could meet them with ease if it would proceed directly, sensibly, and simply. One great trouble with us teachers is that we try to teach all we know, or wish we knew, about each branch. We want to make great scientists of our pupils in the elementary science class, old masters of them in the drawing class, and great authors of them in the mother tongue class. No child can safely expand so far in so many directions. The present-day plan is that of abundant practice in a few fundamentals.

What bonds shall we form? — We want, says Sheridan —

"1. To turn out pupils able to stand before the class and talk for a minute or two upon a subject within the range of their knowledge or experience, speaking plainly, in clean-cut sentences, and without common grammatical mistakes.

"2. To turn out pupils able to write with fair facility an original paragraph upon a subject within the range of their experience or their interests." [1]

Such a paragraph is to be composed of real sentences, not of mere strings of words, should be free from "glaring grammatical mistakes," with common words spelled correctly, common marks of punctuation used rightly, and words chosen and arranged fitly.

Here, then, are the essentials: there must be an experience, and that experience must go aptly into words. We are to build experience-to-word bonds. Further, those bonds must work in any situation, especially (in case of oral language) in the presence of other people. We can readily see, too, that it is not enough to teach connections for words in isolation; one might "swallow the dictionary" and still speak or write poorly. There must be many bonds for combining words. A German who had several dogs of different sizes stated that "Der littlest dog was der biggest." His wife begged indulgence for him, explaining that what he really meant was that "Der youngest dog vas der oldest." The fact was that the youngest dog was the largest.

Oral language requires that there be bonds for using a good quality of voice,[2] for pronouncing words correctly and speaking them out clearly, and for giving appropriate expression, as when the voice is raised to indicate a certain kind of question. *Written* language, "paper work," requires bonds for spelling, writing, punctuation. We must learn, as one

[1] See Bernard M. Sheridan's *Speaking and Writing English*, p. 3. Practically the same statement is found in J. J. Mahoney's *Standards in English*. These two books are really one book with a dual personality — or rather, a pair of literary twins. Both are of the greatest practical help.

[2] For a discussion of voice training, see the chapter on Music.

child said, "to put a decimal point after every sentence that makes a statement." He had, at least, the right idea.

What related responses can the child make already? — The baby is born "with no language but a cry." At one year of age, less or more, he begins to speak a few isolated words. A year later, he may have a vocabulary of 400 words, and babble interminably. According to the Binet tests, at the age of six (the usual school-entering age), he can carry out three simple commands all given at once; can repeat after dictation a sentence of fifteen short words; and can define common objects in terms of use, as when he says "A fork is to eat with." Two years later, when we should expect to find him in the second grade, he can define things in terms superior to use, can write an easy sentence from dictation, and has a vocabulary of words *understood* that reaches to about 3600. At third-grade age (9) he can find rhymes for simple words, and can use three words, such as *boy*, *river*, and *ball*, in one sentence. Some of his more marked achievements beyond that point are the giving of sixty words at random in three minutes and the reporting successfully of a news item which he has read (age 10–12); and (two years later) the putting together of dissected sentences and the discovery of the lesson in a fable which is read to him.

We must guard against taking it for granted that our learner is skilled in reading, writing, and spelling just because he is studying those subjects. The average pupil suffers considerable hindrance in all three branches, I have no doubt, up to the seventh grade. How long would it take you to learn to read, write, and spell the words of a foreign language so well that you would not be hindered in composition?

The great trouble when the child comes to school, is that he has formed too many bonds, has made too many responses already. In careless homes and in the still more reckless streets he has picked up "the English slanguage." He has broken all the rules of the language game, but he has not learned the rules themselves because there was no umpire there to tell him about his errors and inflict penalties. The teacher must now try, on the basis of a few minutes practice per day with the pupil, to beat an opponent who has several years the start of her, and who practices on him in about all the time there is. In our parent-teacher meetings, we must tell this tale and raise a violent cry of protest. Mothers must stop sending to us their bent and broken little twigs with the expectation that we can make stalwart trees of them; and business men must stop the pharisaic performance of binding applicants for positions with heavy burdens and grievous to be borne, in the way of office requirements in English, while they refuse to go home and so much as raise a finger to lift one of these burdens. The "failures" we teachers turn out are the little linguistic wrecks whom the wives of these business men sent in to us a few years before.

Lispers and stutterers. — Some two or three per cent of our pupils fail to respond well in oral language because of lisping or stuttering. Lisping is the more common and the less serious, being often a mere continuance of baby talk. It consists in omitting or transposing or distorting sounds, as in the familiar case of pronouncing *s* as if it were *th*. If the lisping does not persist beyond the age of six, there is nothing to worry about. If it continues, the teacher must not be too insistent on having each sound produced according to standard, especially if the pupil shrinks from

speaking, or is nervous or self-distrustful, but should show the child in individual lessons how to correct his error. General hygiene should be carefully looked after, and so much special drill given on sound production as the child seems well able to bear. Often he can be shown, by example, just how to place his speech organs so as to master the baffling sound with ease. Lisping usually decreases rapidly from the first grade on to the sixth. It is usually caused by the child's placing his tongue wrongly when his front teeth are missing — a habit sometimes continued after the new teeth have grown. Any case that proves unusually troublesome or persistent should be referred to a specialist.

To stutter is "to utter with spasmodic hesitations or repetitions," or even not to utter at all. Most cases appear in childhood, and frequently before the age of six. It is three times as frequent among boys as among girls, the explanation being (in part at least) that so many more boys are left-handed and have their speech disturbed by being compelled to shift from the left hand to the right. The difficulty often dates from some disease or some mental shock such as fright. Scripture's explanation, as shown in Figure 28, is that a brain connection is blocked by some emotional disturbance. This appears reasonable, for if the individual speaks in a high voice, or sings, he may not stutter at all; he is using a different set of bonds. Also, one who stutters when speaking his mother tongue is not likely to stutter when speaking a foreign language which he learned later.

In nine cases out of ten, stuttering can be cured, and the cure can usually be effected in a few months. As the two great causes seem to be brain weakness (such as may result from the exhaustion of disease) and brain blocking, the two great remedies are bodily hygiene and mental

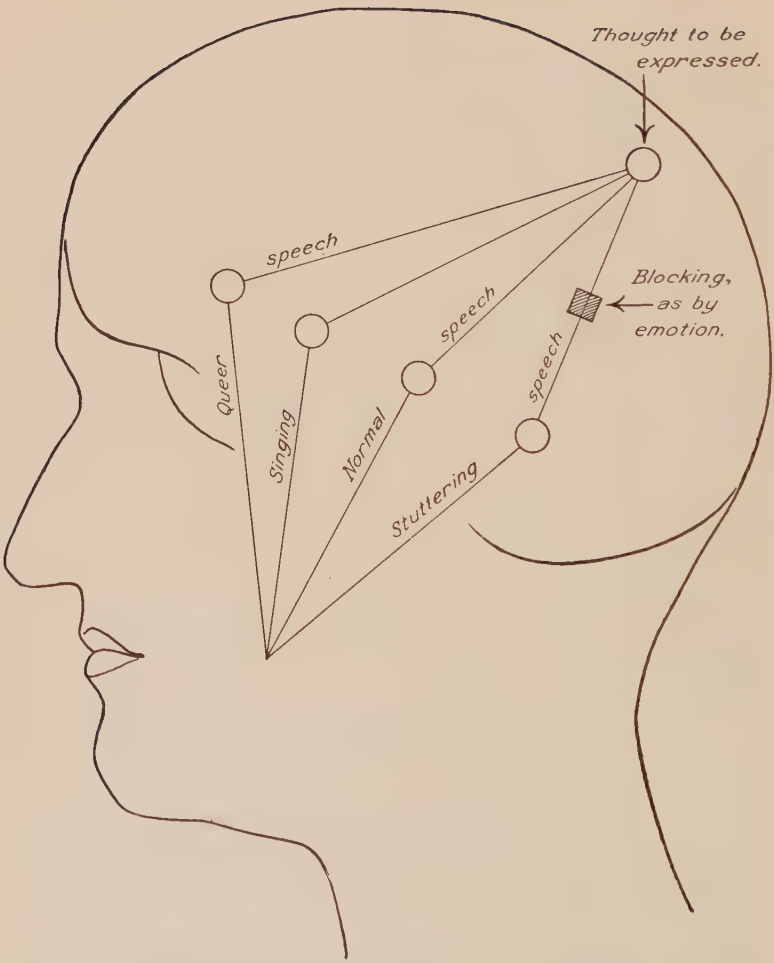

FIG. 28. To illustrate the cause of stuttering. If the individual gets round the emotional blocking by using the high tones of "queer speech," or if he sings, he may not stutter. The cure consists in establishing "normal speech" bonds. — Adapted from Scripture's *Stuttering and Lisping*. The Macmillan Company.

treatment. Considerable success has been won by special health schools. The mental treatment consists in removing all inhibitors, such as family comment, or school ridicule, or obvious pity; and strengthening all facilitators, especially the feeling of confidence — "I *can* control my speech." While a special teacher is desirable, the mental treatment, with simple and carefully graded speech exercises, can be given by any teacher who has the confidence of the pupil and the patience to work with him. More of the method is given in the class exercise at the close of this chapter.

How are the wished-for bonds related? — First, as the baby learns to talk, come independent bonds for isolated words; but connections in series soon follow. Outside my window, young children are repeating, twenty times over, "Eeny, meeny, miny, mo," and all the rest of that classic rhyme. They have formed for it almost a circular reaction (see Chapter II). It means next to nothing, but so does a great deal of what we say in conversation when we repeat the old phrases. Series bonds are in use whenever we memorize. It is easy to overuse them. We naturally suspect the mental ability of any one who memorizes his lessons instead of thinking them out. For the memorizer does not have a fighting command of the words in his memorized series; they are only entrained, and always in the same way. Before he can really mobilize them and use them for his own varied purposes, he must break up his series into units, into words and phrases, and practice combining and recombining them in ways that are new and varied. Material chosen to be memorized should be so dear to the reader and so fine that it will be read and conned over and over until it scarcely needs to be memorized at all.

Trunk line bonds appear at every turn. All our conjugations and other set forms are examples of them. The student who has learned the forms of *amo* finds that he has mastered the conjugation of many another Latin verb. Similarly, our pupils must be brought to see, when the time is ripe, that if they are faithful in fixing the forms of a few verbs, they thereby become rulers over many verbs — but the pupil should practice this as *composition* before he comprehends it as *grammar*.

No one can use a language readily until he has learned to marshal numerous groups of its words as inclusive units and send them to their duty with a single mental command, as the muscian plays a complex chord or run by one act of will. Such phrases as "If I were you," "May I ask you for," "In the circumstances," and thousands of others, come to be, with practice, not so much collections of separate words as single utterance-units, all of a piece — standardized little vocal runs which, once started, will run themselves while we are thinking what next to say.

The upshot of the whole matter is, that words are so many soldiers in our language army. On occasion, they may act alone; sometimes we may have them file by in fixed order; but we want most to be able to command them by squads, and platoons, and companies, or if we aim to be expert, perhaps even by battalions and regiments and divisions and armies, and to combine these units quite complexly. But the good drill master knows that a company is only a large squad, and an army only a large company. It is the "school of the soldier" as an individual, and the school of the squad, that count. We must aim first to get our pupils to master individual words, and especially to command these words easily and accurately in simple sentences and paragraphs.

From sensori-motor to high level — from experience to expression. — We have found that nerve currents run one way only; they are not reversible. Now, the way for composition bonds to work is from experience to expression. The baby falls naturally into the right method: something round rolls out on the floor; he sees it, scrambles for it, and ejaculates "Ball!" Romantic Lorenzo does the same thing. He enjoys the moonlight with Jessica and exclaims, "How sweet the moonlight sleeps upon this bank! Sit, Jessica." And then he expresses to her still more of his experience. One who wishes to be facile in expression should at least make note of the phrases that flash into mind as the experience is going on. A good time to describe a sunset is when you are right there in the presence of the sunset. Name its colors and describe its misty glow of glory and tell what thoughts and feelings it gives you. Authors have their companion notebook for such times, and let no good phrase escape. They even *seek* experiences as a stimulus to the pouring forth of words.

Or, one may give himself up wholly to the event as it passes, live it intensely, and then call it back and describe it. John Burroughs tells us[1] his works have all been done in the spirit of play; that he would lose himself in a nature study trip of some kind by water, field, or wood, and later discover that all during this time he had almost unwittingly been gathering material for a new book. In writing the book he relived his trip, enjoying the literary reproduction of it more even than he had the original.

Now, the method used in school is too often the reverse of this. We place before our pupils a picture which represents no experience of theirs, and in which they may not be

[1] *Wake Robin*, p. xi.

interested, and expect *that* to inspire expression. Or we give them a model from some master author and hope the bonds will work from his words back through their experiences and so down through their tongues. The situation is much like that wherein one boy calls to another who is looking for a lost ball, "Pick it up first, Johnny, and look for it afterward." It is almost as bad to expect pupils to pick up words first and look for the experience afterward.

Underscore this in your notebook: *From experience to expression.*

One difficulty at a time — talk before writing. — The child as he comes to us is a natural babbler. How pass gradually from this stage to that in which he has the tongue of a ready speaker and the pen of a ready writer? One point stands out above all else: Talk before writing — and keep on with talking before writing even after the pupil can compose with his pen, as the best means to better writing.

First of all, we must train the little people out of their baby talk; for no less than a fourth of them, when they enter the first grade, have not put away all their babyish habits of speech. They still lisp and are clumsy, and manage their little sound factories very awkwardly. It should be a part of the work in language — and one of the first parts — to train the tones till they are smooth and musical, and the lips and other organs to shape the sounds with a caressing kind of deftness and accuracy.

Writing is a heavy burden added. Attention flies to pencil and fingers and paper and spelling and capital letters and periods. To make a new writer express himself in writing is much like having to send all your messages by flag signalling or telegraph; or, if you are unpracticed in typewriting, to compose all your letters on the machine.

But further, our best writers seem to be those who talk to their readers. Some of them, while writing, bring the reader before them in imagination and speak to him directly, as you do, perhaps, when you write to a friend. (I am imitating these good writers by imagining you are here with me now.) Our pupils, then, are following a standard process if they discuss every subject before they write about it. Speech is more plastic than writing. We must shape our subject in the air before we let it harden into lines on paper.

One step further: as speech comes before ability to write, so does thought come before speech. Thinking is not merely talking to one's self,[1] and even if it were, a little self-conversation would be the best of preparation for talking to somebody else. To "think before you speak" is just another case of prevision in learning. Gradually, we pass directly from thinking to writing — "think what we shall write." The better we know the game, the better we can look ahead, anticipate what is likely to happen, and make it happen right. If children learn first to "feel the swing" of oral phrases and sentences, they will feel later, when they write, just where commas and periods should go, and with what effect their sentences will flow off the paper into the mind of the reader.

[1] Even experts sometimes assert that thinking is talking to one's self, or speaking low, or sub-vocalizing; that the child who cannot tell a thing does not know it, etc. This is the error of one, probably, who naturally thinks in words. But surely thinking may be carried on in any kind of mental unit — in colors and shapes by the artist, in tones by the musician, in touches and movements by the motor-minded. The child who "knows but cannot tell" may prove to you by an action test that he does know. A stutterer may fly into a rage and rush round in a circle because he cannot utter what he has thought. And in what terms does a deaf mute think?

Standard courses of study give all the composition time in the first grade to oral work, and from about four fifths of it in the second grade down to about one half of it in grades seven and eight.

Here, then, is another entry for your notebook: *Talking before writing. Thinking before speaking.*

Which bonds shall we form first? — Which expressions are easiest and most interesting to learn, occur most frequently, and prepare the way best for all that we have to teach later? If you were in Paris, learning French, you would want to find out first how to say "Good morning" and "How do you do?" how to carry on table talk, call up a friend on the telephone or call on him at his home, ask for what you want at a store, carry on conversation at a party and leave politely at its close. The child, who is much like a little foreigner among us, so far as language and manners are concerned, needs, also, to know how to express his desires. To guide her through first and second grade language work, the teacher who needs it should have a little book on American daily life, patterned after similar books on French daily life.

And you, teacher, you are the Great American in your grade — speak as you want Young America to speak. How few can say "Good morning" and make the morning seem as good as it should! Make a play and a party of all these daily-life occurrences — dramatize them, not stiffly, leaving the feeling that there is only one way to do them and that we are in serious danger of missing that way; but with the kindly spirit of democracy and good fellowship in the foreground all the time. Let the pupils meet and say "Good morning," enter the room, and leave it, make calls on each other, talk on an improvised tele-

phone, hold a party, keep store, dramatize the reading lessons. Nor need it be all dramatics; there can be a real party, with real parents present, and perhaps with real sandwiches.

From oral work to written.— How can we make the important transition from oral to written work one step at a time? (1) Letter cards may be arranged so as to reproduce the sentences in the reading book. (2) The pupil may copy in writing some easy matter from the book, perhaps something he has already formed with letter cards. (3) The children may be given hektographed copies, in the teacher's handwriting, of a short and very familiar story, from which are omitted certain words that are to be filled in. (4) The teacher may write on the board a four-line memory poem, have it observed, and then erase all but the first and the last words of each line. Pupils are to try to reproduce the whole. (5) The children may form, with the letter cards, whatever words or sentences they please, have their work corrected, and then copy it in writing. (6) The teacher writes on the board a short, familiar memory gem, erases it, and asks the pupils to reproduce it in writing. (7) The class "talks up" a story paragraph of about three sentences. The teacher writes it on the board, has it observed, and then erases parts or all of it and asks the pupils to tell the story in writing. (8) A similar story, after being "talked up," is dictated by the teacher. (9) A story, after being orally created, is written by the pupils without further guidance.

Other exercises may be used, and some classes may not need such carefully graded steps and so much guidance. But the list will help us plan.

Coaching the language team. — If we are coaching a tennis player or team, we may notice first that the service is poor,

and concentrate on that. Then perhaps our team loses because of a poor backhand drive, and we go after that. Lobbing is the next worst point, and we practice it hard for a time. So it goes through all the points of the game, and then we take them all up again, and again, and again.

This is about what the teacher of composition must do — find the weak places in the work of her grade and strengthen them. A book on this subject, especially in lower grades, is a kind of necessary evil — necessary because most teachers do not have time to do their own planning. But we should feel perfectly free to skip about wherever we please in the book if we are to gain anything from it. This week we may attack mispronunciations especially, next week double negatives, after that the past tenses of verbs. If there is any such thing as an ideal course of study in composition, it seems not to have been produced. The coach must decide what the team most needs — and what each player most needs.

There comes a time, in the seventh and eighth grades, when the pupils can profit by a clear view of the sentence, element after element, subject, predicate, adjective modifiers, adverb modifiers, and so on through the list, systematically, one difficulty added at a time, with each difficulty mastered by composition practice. This is what is meant by "elementary grammar." The great majority of children like it when it is properly presented, as has been shown by actual vote sufficiently widespread to be representative. They should have what they need, in simple, direct, and effective form, discovering principles from practice and again applying them in practice, to make sure that it is "composition-grammar."

Readiness. — Feeling is first, form follows, in language as in everything else. To make a train of thought move, there must be some fire at the head of it.

Environment is the great motivator. Some go so far as to say that if a child has the right kind of social environment there is little need to teach him language, and if he does not have home surroundings which are conducive to good English there is little use in trying to teach him to speak correctly. It is the herd instinct that controls the herd. Even the well educated feel rather sheepish and ashamed to use good English where it does not prevail. We throw in a little slang or a few careless expressions as evidences of democracy and good companionship, to indicate that we are all on a level and understand each other. All-round-town English needs an annual Clean-Up Week about fifty-two times a year. All those who want to help the teacher bear his burden, can do no better thing than to look to their speech, especially whenever they are in the presence of children.

"Good English Week" and "Better Speech Week" indicate an effort in this direction. At such a time, talks on better English may be given, children may make posters in the drawing class, and each try to reform his neighbor by catching him in his evil ways. In all this enthusiasm of reform, we must take care to exercise and strengthen the bonds for the good forms, and to let those for the bad ones sink out of attention as much as possible.

But the atmosphere of the schoolroom is more directly under the control of the teacher. "Am I among enemies or friends?" is the question that wells up instinctively in the hearts of all of us whenever we join a group. When have *you* made your best speeches and conversed most volubly? When you felt that the audience or the party was made up

of people who were friendly and sympathetic, and that you were having a good time with them. Now, somebody must create this spirit in your schoolroom, and that somebody is *you*. Do not lash yourself into that foolish over-sprightliness of manner that so many teachers assume and then wear yourself out by doing all the talking. Take rather the attitude of the good and sensible hostess who entertains by getting her guests to talk.

A suitable task and stimulus. — And what is it that "draws people out"? The feeling that they have something to say, and that somebody wants to hear them say it. One teacher states that the best oral language lesson he ever heard was developed by having the boys of the class explain their games to the girls, and the girls explain their doings to the boys, both using blackboard drawings. *Experience before expression* — and everybody's experience has been different from everybody else's. But we can hardly assign to a child the general subject of "My Experience." We can ask him to tell about "The Game I Like Best," or "How I Would Spend a Hundred Dollars," or even such a mundane matter as "The Best Thing I Ever Ate." Composition should be the verbal re-living of life.

Special stimuli are many. The suitable task is itself the best. Language games are widely played, and some good teachers feel that they cannot be played too much. Many can be found in books,[1] and we should not hesitate to invent others of our own. For instance, if we want to put an end to "hain't got," we may let one pupil be a man buying things, and the others have only those things with names beginning

[1] Myra King — *Language Games*. Educational Publishing Company, Boston; and A. Deming — *Language Games for All Grades*. Beckley-Cardy Company, Chicago.

with a letter which the teacher puts on the board and erases while the buyer's back is turned. He who is "It" then asks one after another, "Have you any ——?" It may be "books," "potatoes," "apples," or anything else. The answer must always be "I have no ——," or "I haven't any ——," until the buyer asks for something the name of which begins with the lucky letter. Then the pupil questioned admits that he has the goods, and in turn becomes "It." So far as in us lies, we must arrange our games so that every pupil will exercise the very bond we want.

Samples of written work should often be read to the class and may be hung up. The teacher may also ask for the repetition of good oral work to call special attention to it. The fine art of being a critic must be practiced at length; for here, as in the drawing class, pupils may learn much from each other, especially when it comes to the coining of phrases. But here also the friendly spirit ought to prevail. Let us take the attitude of trying to help each other. Also, as with other branches, pupils must be held responsible for good work outside of class, and may be marked on their everyday language, oral and written, as much as on the work of the composition period.

Story-telling. — Story-telling induces readiness and provides exercise at the same time. It is the teacher who starts these little dramatics, but the children will continue them. The first essential in story-telling is to *choose a good story* — and only the children can say what is good, for them. We must try out our tales and judge their merits by their effects, as a public speaker can detect his best jokes by watching how the audience laughs.

The second essential is to *enjoy the story with the children.* This is the attitude of the best speakers everywhere: "Come,

let us enjoy this good thing together." This means that we must know our story intimately, though not necessarily by rote, that we feel it as if it were all fresh and new, and that we make it vivid, "see the picture" ourselves and by good words and gusto make the children see it. In brief, do as you would be done by: tell a story as you would like to have it told to you.

Exercise. — William Jennings Bryan has summed up the essentials of composition in three simple rules: (1) Have something to say. (2) Say it. (3) Say it so you will be understood. As we pass from experience to expression and try to "say it so we shall be understood," we find that (just as it would be in a foreign country) some expressions are in common use and well understood, and others not. Every one of us must pick up the common forms by *imitation* — a word that should be printed in capitals in every composition book. In language study, imitation is the closest approach to the tandem method. Memorizing and repeating the words of some good thing that appeals to us is like tracing a picture which we like. Following the teacher as she speaks or writes is like having her dictate a picture to us line after line. Further, language pours itself, in ways too intricate to be traced here, into forms that are stamped on our minds. A boy was impressed by the story of *Scrapefoot,* in which the fox picks himself up and shakes one foot — no bones broken there; then another foot — no bones broken there, etc. Soon after, he wrote a story of a bicycle fall: "I tried the front wheel — nothing broken there; then the hind wheel — nothing broken there," etc. In composition, we should have to go on a long hunt to find anything that is not, in some sense, imitative.

One great trouble with "Exercise" is that there is too

much of it — of a certain kind, and that is the written, unguided kind. In the first place, both common sense and investigation give strong evidence that the average teacher is prone to assign too much written work (to the ruin of penmanship in many classes). And secondly, where the total amount is legitimate, the assignment is often by infrequent long themes instead of more frequent short ones. Snakes, some of them, can do well on one monster meal and then a long fast; but written composition grows best on the plan of little-and-often.

Guidance can be given in many ways. Suppose we have passed from the babbling beginning to the point where the pupils have the "sentence sense" — can form good simple sentences readily, and we want to compose a three-sentence paragraph. Sheridan [1] suggests that we call forward three children who have tops (that being the topic) and say to the first, "Tell me you have a top." He does so. Then to the second child, "Tell me the color of your top. Begin this way: 'It—'" The child replies, "It is blue." To the third child, "Tell me one thing it can do. Begin with 'It.'" "It can spin," is the reply. The teacher puts these sentences together and lo! a paragraph, "one difficulty at a time." We can use such a plan for both oral and written work.

In the higher grades, the outline of what is to be written takes on considerable importance. Perhaps this can best be approached from the standpoint of time order. If we simply tell a story as the events came to pass, we have an outline, a first, a second, and a last. A first rough draft of a composition, with attention wholly on matter and not too much care for correctness, should be permitted, and per-

[1] *Speaking and Writing English*, p. 52.

haps encouraged. But it should be followed by a second, smooth draft.

Prevention and correction of errors. — "Correcting papers" seems to stand out more prominently in English than in any other branch. But it is guidance and prevention we want. Every new thing should be learned in the teacher's presence till the ideal is clear; then the pupil can practice alone till the familiar form is fixed.

The teacher can help herself out in various ways: by having correct forms copied from book or board; by giving dictation and then uncovering the correct form, previously placed on the board, and having pupils correct their own work under supervision; by guidance when papers are being written, passing from seat to seat and giving help; by running rapidly over all the papers of a grade, not to correct them, but to collect the major errors so that these can be publicly condemned and the correct forms drilled in; by insisting that the older pupils keep tab on their own errors; by furnishing first hektographed (preferably printed) matter with blanks to be filled, and later the complete forms so that the pupil can do his own correcting; by having pupils correct each other's papers — the teacher keeping guard over the process, of course; and by insisting that each pupil form the habit of correcting his own paper to the best of his knowledge and belief before handing it in. To aid in this last process, a form, or outline, may be furnished, that no guilty point may escape.[1]

It should be constantly borne in mind that careful oral composition is the best preparation for the correction of many written errors. The same errors (aside from misspellings, etc.) are made in oral as in written speech. Nearly

[1] For such an outline see J. J. Mahoney's *Standards in English*, p. 35.

half the trouble lies with the verbs, especially with common verbs like *be, see, come, do, go, sit, can, lie, give, break, ride,* and *learn.* Another large fraction (perhaps 30 or 40 per cent) of errors is found in the misuse of the pronouns (*me* for *I*, etc.); in mispronunciations; and in the use of double negatives. Following these are a comparative few in the form of colloquialisms, the misuse of adjectives and adverbs, etc. A knowledge of which errors are most common [1] enables us to make the best use of our time and ammunition in fighting the enemy. The teaching of grammar, however, does not enable us to capture his strongholds. The errors and the grammar run along parallel as we go up through the higher grades.

Effect. — *Drilling without killing* should be our motto so far as effect is concerned. The street urchin is often quite an orator in his way, for he has something to say, says it, and says it so that he is understood! But he does not care to have his words marshaled in precise military array, nor in stiff uniform; he prefers a kind of civilian army, hiking along in straggling companies. And do we not all secretly sympathize with him a little? Thought and feeling must take first place, and correctness second. Great authors leave their *t*'s to be crossed and *i*'s dotted on rainy days sometimes, while the pen dashes on to keep up with a nimble thought. The little author in the third grade may feel his enthusiasm quite damped if his fine thought is all overlooked because he has, somewhere, left out a period. Let us make it a rule to praise first and criticise afterward.

The preceding parts of this chapter have probably made evident the conditions that are present when the best nervous effect is produced. In general, the work lies within

[1] W. W. Charters — *Curriculum Construction,* pp. 194–211.

the range of the pupil's experience and interest, the spirit of the class flows in buoyant streams, there are conversational relations between teacher and pupil, variety spices the work, the children are faced by but one difficulty at a time, and all good work is met with a fitting meed of praise and congratulation.

Testing essential bonds. — If we look over the list of bonds we want to form, we shall know just what responses we want to test out. Whenever we can, we measure responses by selected samples of those very responses. We want to measure skill in composition by carefully chosen, nicely graded samples of that very kind of composition, ranging in quality all the way from zero to the highest.

For written composition, such measuring scales have been constructed.[1] By saving and grading samples from her pupils, a teacher can form a scale of her own which, for securing the ends of justice, has great value. Actual samples of work from each school grade, very helpful as a guide to what can and should be done there, are found in the excellent works of Sheridan and of Mahoney (already referred to).

Oral composition, which is still more important, is more difficult to measure. For standards of this kind, we must depend on the phonograph.

[1] The Ballou Scale can be obtained from Harvard University. The Hillegas Scale and the Trabue Test are furnished by the Publication Office of Teachers College, Columbia University, New York City. The Trabue Completion Language Test, as its name implies, is rather a test for language in the narrow sense than a scale for measuring original compositions. It is also a test for thought.

CLASS EXERCISES

I

Examine rather carefully the following rough outline of Scripture's method of curing stuttering:

1. Teach control of breath, and simple singing, as the singing of octaves. (Stutterers do not stutter when they sing; for the singing is controlled by brain paths other than those used in ordinary speech, connections that have not been blocked by any disturbance.)

2. Have the subject sing, and then speak, slowly and distinctly, *familiar* matter, one syllable on each beat of the metronome, 54 per minute. *Use a tone of voice different from the old, stammering voice.*

3. Develop expression through imitation.

4. Drill until the new voice and expression have become habitual.

5. Work for very simple *original* speech. (*a*) Teacher and pupil read together, taking alternate lines. (*b*) Simple question and answer. (*c*) Telling a very simple story.

6. Speaking under gradually more difficult conditions, as before another person, over the telephone, in the presence of a group, etc.

7. Working for clear *thought* as a means to clear speech. Establishing the habit of keeping a clear head at all times.

Study the above as a sample of introducing but one difficulty at a time. Then prepare an outline of carefully graded steps whereby you would hope to develop in a very socially timid pupil the power to speak before an audience.

II

Let each try (outside of class) to invent a language game. The games may be presented to the class, criticised, and so far as time permits, played. Remember, the object is to give each pupil as much exercise as possible on the point or points which the game is to strengthen.

FOR FURTHER STUDY

1. Make a list of the more common daily uses for oral speech. Of the more common uses for written composition.

2. Give the history of any lispers or stutterers you have known.

3. Tell what you would do to help a child who had difficulty in giving the sound of *p*, *t*, *f*, *th*, *m*, *ng*, etc. What would be the effect of suggesting a familiar word in which the sound appears, as *sing* to bring out the sound of *ng*?

4. In teaching composition, what use would you make of models written by great authors? What difference does it make whether the model (*a*) describes something which falls within the child's experience and which he *wants* to describe, or (*b*) deals with something which he has never experienced and does not care to talk or write about?

5. When we want guidance and help in some piece of drawing, we may study an excellent sample of similar kind done by a superior artist. What is the analogous situation in composition?

6. Think of a few words, phrases, or forms of expression that you have acquired lately. How came you by them?

7. Which should you prefer as the best route to good oral English in adult life, a childhood spent where you heard none but correct language, but with no later study of grammar as a science; or a childhood in which you picked up much bad English, followed by intensive study of grammar at the age of eighteen? Why?

8. Make a list of twenty or more composition subjects that would certainly fall within the range of experience and interest of fifth grade pupils (about eleven years old).

9. What importance would you attach to having pupils individually keep a list of their own errors? What use could be made of it?

10. If we use such terms as *subject*, *predicate*, *noun*, *verb*, etc., in our composition work, are we then necessarily teaching "formal grammar"? Explain.

11. Show how interesting material discovered in other subjects can be utilized in the composition class.

12. Show how you could make composition and spelling reenforce each other; composition and writing; composition and reading.

13. What have you learned in this chapter that might help you in teaching English to foreigners?

14. Make a list of everyday doings that could be enacted in the schoolroom so as to get practice in good language. For instance, let the teacher act as mother and a small child ask for a lunch.

15. In drawing, we found that we must teach the pupil to *observe* as a preliminary to good expression. Is there any similar necessity in composition? Discuss.

16. From the standpoint of composition, what value do you place on the keeping of a diary? How can one draw on it for other composition work?

17. Show the benefits to be gotten by having the pupils of one class, grade, or school, correspond with those of another, perhaps in a foreign country.

18. How would you attempt to break children of the "and" habit (using too many *ands*)? Are there many *ands* in the Bible? How is this?

19. Some think that *ain't* will some day be good English. What do you think? From the standpoint of ease and convenience, should we not drop the apostrophe and then put the word in the dictionary?

20. Tell how oral recitations should be carried on in all branches, if we want the latter to help toward oral composition.

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Appendix to Chapter XIII

The following list of topics is offered as suggestive of the amount of technical grammar which may well be woven into the course in Composition and Grammar in grades seven and eight.[1]

1. Subject and predicate, including subject as word, phrase, or clause.

2. Classes of sentences according to meaning; including a clear notion of the sentence in practice, its beginning with a capital, and its closing with a period or other punctuation mark.

3. The parts of speech (without minute subdivisions) and their use. Under this head there should be included the proper noun and adjective, in order to teach their capitalization, the division of verbs into transitive, intransitive, and copulative, and the distinction between coördinating and subordinating conjunctions.

4. Dependent and independent clauses. Noun, adjective, and adverbial phrases and clauses.

5. Sentences classified according to form.

6. Construction or building up of sentences, gradually increasing in complexity, the expansion of words into phrases, and phrases into clauses, and the condensation of phrases and clauses into words.

7. Analysis of simple sentences with no more than two phrases.

8. Analysis of compound sentences containing two simple clauses

9. Analysis of complex sentences containing one dependent clause.

10. Synthesis, or combination of two or three short sentences containing related ideas into one sentence of appropriate form.

11. Principal parts of verbs commonly misused in the vicinity, to be studied by drills in the use of the past tense and past participle in sentences.

[1] The list is taken from *Reports of Two Committees of the Allegheny County (Pa.) Principals' Round Table on Essentials in English and in Oral English.*

12. Conjugation in the indicative mood, including verbals treated as parts of speech according to their use in the sentence; paradigms to be built up.

13. Declension of relative and personal pronouns, and of nouns in the plural and possessive.

14. Comparison of adjectives and adverbs.

15. The agreement of verb and subject and of pronoun and antecedent.

"*The test of a pupil's knowledge of grammar should be his ability to make use of it in speech and writing.*"

Charters, after his study of errors made by children in speaking and writing, examined the language texts used in the Kansas City schools and stated that the following might be omitted from them: the exclamatory sentence, the interjection, the appositive, the nominative of exclamation, the nominative of address, the objective complement, the objective used as a substantive, the adverbial objective, the indefinite pronoun, the classification of adverbs, the noun clause, conjunctive adverbs, the retained objective, the infinitive except the split infinitive, mood (except possibly the subjunctive of "to be"), the objective subject, the participle (except the definition and present and past forms), the nominative absolute, and the gerund. It was also recommended that two topics be added, the pronoun "what" and proper and numeral adjectives.[1]

[1] See *The Fourteenth Yearbook of the National Society for the Study of Education*, p. 103.

CHAPTER XIV

Reading

Exercise. — Imagine that you are in Greece, Russia, Palestine, or some other country, the language of which you cannot read, and the alphabet of which is strange to you. You know the common words of the language by sound, and can speak them in simple sentences. You wish to learn to read the books and other printed matter of that country — or at least you are made to feel that it is your duty to do so. In general, what kind of reading matter would you prefer to begin with? And do you think you would like to be taught the alphabet first, or to begin with some of the words that you can already understand and speak? (Let us suppose the language has many silent letters, etc.) Outline briefly the general method of teaching that you think would work best in your case.

A child is similarly situated with regard to the English alphabet and language. Would it be safe to take your conclusions from the above and apply them to him? Why or why not?

The why and wherefore of reading. — Man wrote, and then he read. He first folded a meaning, an experience, into his composition, and then unfolded it, reproduced it out of his reading. He has had two main reasons for writing: one is that stone surfaces and clay tablets and paper books hold a record more accurately and lastingly than brain cells do; and the other is that, under favorable conditions, people distant in time and space can from the written symbols reproduce the experience. Writing is putting an experience into lasting symbols for purposes of record or communication. Reading is the reproducing of experience from such symbols.

The most vital and perfect way to receive most messages is by personal presence and the living voice, that "most expressive organ of the soul." The phonograph and the radio telephone are working wonders in this direction, and will no doubt ease the eyes of coming generations very appreciably. "Visual education" and auditory education will do team work. Where direct talk can not take place, expert writers, as stated in the last chapter, seem to summon the reader, in imagination, and talk to him on paper. Plato and Shakespeare and others of the greatest writers have addressed their finest writings to the ear rather than the eye. Great literature is greatest when it is voiced. What would we not give to hear Shakespeare read from his plays for an evening, or Dickens read from his own works! [1]

Situations and responses. — What are the reading situations in everyday life, and how do we respond to them? There are those who say that reading aloud is a very infrequent occurrence outside of the reading class. I earnestly pity those who live in an environment where this is true. Outside of the school, the foundation institutions of our civilization are said to be the home and the church, and it is in these places, probably, that our most precious reading is done. "At home," says Huey, "there is scarcely a more commendable and useful practice than that of reading much of good things aloud to the children. Scudder, in his *Childhood in Literature and Art*, says there is no academy on earth that can compare with this practice. Thinking the same subject together gives a bond of union which binds the family together; and the most blessed memories of many of us cluster about the spell which held us as we listened

[1] It has been suggested that our books may some day be made of a kind of phonograph film by means of which the speaker's voice can be reproduced.

time and again to mother or father or grandparent reading in the dear familiar voice."[1]

At a mothers' meeting, a teacher of the second grade was urging the mothers to read more to their children, and suggesting stories for the purpose. "But," said they, "we cannot read as you do. The children will not listen when we read" — and that is another pitiful story. The great majority of our girls are some day going to run these little private kindergartens. They should be able to read aloud, and to read well enough so that the children will listen. Many other situations there are, too many to mention, where skillful oral reading aloud should be the response. Surely, everyone should be able to read aloud in a satisfactory manner the "minutes of the previous meeting," or the report of a committee, or a newspaper article when there is but one copy for the family circle or a circle of friends.

There are many who prefer to read aloud at times, either for better understanding or for pleasure, even when reading for themselves only. Abraham Lincoln was one of these. He explained that he understood better what he was reading if he got it through two senses, the eye and the ear, than he did if it came to him through the channel of the eye alone.[2]

In most reading situations, we are either compelled to proceed silently for our neighbor's sake, or wish to do so for our own purposes. In many cases, especially if we have been well schooled in oral reading, we learn to "reproduce the experience," or as much of it as we want,

[1] Edmund Burke Huey — *The Psychology and Pedagogy of Reading*, p. 334.

[2] Perhaps the movement of the lips should be counted as a third sense. Children seem to learn their spelling lessons more quickly and effectively if they move their lips, forming the letters energetically, even while studying "to themselves."

without the aid of the voice, just as a pupil who has had much practice in thinking-talking-writing will at length write his thought silently without the middle step of talking, at the same time testing out by inner speech how his sentences will feel and sound when his reader lifts them from the paper. If we are willing to sacrifice what the voice contributes, we can also gain in speed, for if we uncouple our talking machinery and let the inner speech run on alone, it keeps on going when we are breathing in as well as when we are breathing out, and even faster than when the lips are moving. We often wish to "skim through" our reading matter; for much that is printed is to be "tasted" only — it is not all real literature by any means. And even if it were, we may want to glean from it some one theme and not to grasp it as a whole. Such gleaning and skimming is likely to be a rapid, flitting kind of process, with words slurred, half pronounced, or omitted, and so it can best be carried on silently.

No response and over-response. — In a middle western automobile-manufacturing town, hundreds of people, day after day, having performed their six hours of labor, were seen lying for hours in the park just across from the public library. They were not there to rest, but were in that nervous small-boy condition of "don't know what to do." It did not seem to occur to them to enter the library.

On the other hand, there are those who abuse their education by reading too much, reading when they ought to be doing independent thinking, or going about their business, or engaging in sport. They get drunk on print as others get drunk with the "movies."

It is the old story of power without purpose. We want to graduate readers who, because they have a purpose in

life, will read to fulfil it, and who consequently will know when they have had enough and will stop at that point.

What bonds do we want to form? — Our aim in regard to forming bonds in reading is just the reverse of what it was in the teaching of composition. There, we were forming connections to work from experience to words; but now we are building word-to-experience bonds. And there is a corresponding danger and caution; just as, in composition, so many have an experience worth relating but cannot command the train of words to express it, so in reading there is danger that a train of words may run through the mind without carrying and delivering their load of meaning. Telegraphers can "receive," putting down word after word as the clicks come in, and not know, when they have finished, what the message is which they have recorded. So children can "receive," either orally or silently, word after word from a page, without getting the meaning. If you have ever pronounced every word in a Latin or other foreign-language sentence without being able to give the meaning of that sentence, you know how such a thing can be, even when the meaning of each word, taken by itself, is fairly clear. As in composition we must form bonds for words-in-groups, phrases, clauses, etc., so must we in reading. Our pupil must be made to feel, from *a* to *izzard*, that unless the combinations of words of the book mean something to him, and something definite, he is not reading; and that it is possible to pronounce all the words of a book without ever reading it at all.

Imitating Sheridan's statement of aims in composition, we may say that we want, in teaching reading:

1. To turn out pupils able to stand before the class and read a page or two of some selection within the range of

their knowledge or experience, speaking plainly, in clean-cut sentences, and with reasonably good expression.

2. To turn out pupils able to extract and arrange in order with fair facility the essential facts of an article within the range of their experience or their interests.

We may well add a third point: to turn out pupils who will go on reading so as to go on growing.

Related responses that are ready. — We shall some day improve our practice, and not start children to reading merely because they have started to attend school. Since we are forming word-to-experience paths, there cannot be much reading until there has been quite a bit of experience. G. Stanley Hall, in his classic study of "The Contents of Children's Minds on Entering School," [1] showed how poverty-stricken many of these little minds are. He warned against assuming that they know much of anything that is of value from the teacher's standpoint when they appear at the schoolhouse door, and asserted that a few days spent in the country at the age of five or six has raised the level of many a city child's mind more than a term or two of schooling would have done.

A child should get a deal of sensori-motor experience and he should do a deal of talking about it, before he starts to read. If he has not enjoyed these two luxuries, we should treat him to them, so far as we can without violating too much the traditions of the community, before he tries to breathe life into the dead bones of a book. In general, it would be desirable if we could go ahead for the first half year with our school-habit forming and construction work and play and nature study and drawing and singing and talking before starting reading at all.

[1] *Aspects of Child Life and Education*, pp. 1–52.

Some of the ready responses we should be able to build on are a vocabulary of limited size and a love of talk, an insatiable appetite for stories and pictures, and a passion for play. The extent to which these natural desires have been fed and the children developed at home will be found to vary from zero to the upper limit. Some will even be found to have read a little, and others will know the alphabet. Teachers sometimes object to these crude home beginnings in reading; but the wiser way is to take advantage of whatever a pupil can do and push on to further conquests.

Some necessary responses that are unready. — There are two important habits which must be acquired gradually, which cannot be taught very directly, and for which there may have been little preparation previously. These are inner speech and eye movement. Inner speech grows out of outer speech. Attention has already been called (in the chapter on Spelling) to the fact that children think aloud, talking to themselves. They naturally "talk right out loud" in school. Voice is first inhibited, and later the lip movement should be, in reading at least; but the "feeling" of saying the words inside still goes on, and in most adults it never dies out.

The eye, as we read, does not glide smoothly from end to end of a line, but goes by jerks, or strokes, the lengths of which vary and depend on how much, at any point, can be taken in at a glance. Place a finger on your closed eye and read with the other, and you will sense these jerks very plainly. The eye works hard to master the most efficient movement, and must be given time for gradual progress, with plenty of rest. The nearer the book, the less eye-jerks to the line. Children try to ease the eye by bringing the

book very close. But it should be kept at proper distance, a foot from the face,[1] unless physical defect makes this too great a distance, in which case eye correction is needed.

A very few children cannot learn to read because of what is known as "word blindness." They may be normal in all other respects, eyes and all, but appear to lack, in their brains, the cells necessary to "map," that is, respond to, printed words.

One difficulty at a time.— In colonial days, and for a long time after, it was thought that the least possible difficulty for a beginning reader would certainly be a letter, and accordingly the alphabet was taught. Then came two-letter combinations, three-letter combinations, and so on up to sesquipedalian words.[2]

But we must teach first the bonds that are easiest and most interesting to learn. The child already knows a number of words and sentences as they have come in through his ears and gone out through his mouth. The easiest and most interesting thing for him is to take in these same words and

[1] For an account of eye movement in relation to reading, see Edmund Burke Huey's *Psychology and Pedagogy of Reading*, Chs. II–IV; or Charles Hubbard Judd's *Reading: Its Nature and Development*, Chs. III–V.

[2] In imagination I can see the school-dame of my boyhood days, as she called her several pupils and classes. First came the little alphabetarians, one by one, to whom, in regular order, the whole twenty-six letters were administered at a dose, — just four times daily; — the teacher pointing at the letter and pronouncing it, and the pupil repeating it after her, — the only variation consisting in an occasional snap upon the ear for inattention. For days, and weeks, and months, — perhaps for years, — was this operation continued before the letters were fairly understood. Then came the little boys and girls in *b-a, ba, b-e, be, b-i, bi, b-o, bo, b-u, bu,*etc., up through *baker* and *cider*, until the oldest had received their turn. If the performance was attended to just four times daily, the requirements of parents and committees were met, and all was considered right. — From *The Teacher's Assistant*, by Charles Northend, published 1866.

sentences through his eyes, and then switch into the old tracks, using the same mouth bonds as before. The teacher finds it easier to teach him the word *little*, already familiar to his ear and tongue, than to teach him the single letter *l*, to which he is wholly a stranger, and which, standing alone, cannot mean much.

How children recognize words. — Children recognize words at first much as you do people with whom you are not yet really familiar. There is that tremendously tall man — you can't forget him — or the one with the long nose, or the funny eyes. In the same way, your beginner may know that the longest word teacher writes on the board is "bumblebee," that the one with the two round eyes in the middle is "book," and so on — and that may be practically all he does know about them. A word, for a beginner, is more of an *object*, like a toy, about so long and so wide and with prongs sticking out here and there. They often recognize a word with equal ease whether the card that holds it is right side up or upside down, just as they know the dog when he is lying on his back, and as you can recognize a Ford car even when it is upset. One child, on being asked to find "shoes," said that "dress" looked so much like "shoes" she was afraid she would make a mistake. These two words are of the same length, both curly at the end, and each has one letter that sticks up at the beginning. Glance at a page of strange-looking Hebrew, or Russian, or Greek, and try to pick out the same word in several different places, and you will have the child's experience right over. It may be the length of the word that will help you, or the first letter, or the last, or some peculiar letter, or the general blackness of the work — anything to make it look "funny" and different from the rest.

How children must learn to know words. — If you have twins or other close similars in your class, how do you tell them apart? You must analyze their respective make-ups quite minutely if you want to tell "which from t'other" and be sure of your result. There comes a time when children must do the same with words. One pupil had trouble to distinguish "sing" and "song." When she had finally mastered them, she was asked how she knew which was which. "By the looks," she said. When questioned further, she put her finger on the *i* and the *o*.

Printed words are made of letters, and these letters stand for sounds. As soon as our pupils can be brought into readiness for it, they must be shown how to take words apart, and they must form bonds between the sight of a letter and its sound (or most common sounds). Even then we do not need to teach them the *names* of the letters; but when *m* appears as stimulus, the pupil should respond by giving or thinking the characteristic sound of *m*, etc.

If each letter had but one sound, and if that sound were always represented by that one letter, the child who had formed his letter-sound bonds would have a key to the pronunciation (all except accent) of every new word he met. Let us hope English will some day be that kind of language, strictly phonetic. But it is not now, and so we have to play catch-as-catch-can with it.

Which phonetic bonds first? — At once the question arises, Which phonetic bonds shall we form first? And the answer is, Those that are easiest to learn, that occur most frequently, and that prepare for most other bonds-to be. The consonant bonds are easier than the vowels because most consonants have but one sound, while the vowels have several each. Further, the consonants occur

most frequently in strategic places, and so give better preparation for the learning of the many new words that are to follow. The explanation is this: experiment shows that we recognize words largely by their first letters and by the letters that stick up above or down below the others. These (together with its length) fix a kind of outline for the word, which we come to recognize at a glance, as we do the outline of a friend. Now, first letters are much more frequently consonants than vowels, and the letters that protrude are practically always consonants. We can actually leave out most of the vowels and still read very well, as the writers of Hebrew and of Pitmanic shorthand often do.

Then there are the "phonograms," groups of letters that remain together in many different words, as *ap* in *cap*, *nap*, *rap*, and *tap*. These make many words seem as much alike as brother and sister, and so we speak of word "families," as the *ap* family or the *at* family, and either teach them or collect and review them in this way.

Summary of word mastering. — Some teachers, in order to keep *story* and *meaning* prominent from the start, prefer to begin with whole sentences, dividing these into phrases and the phrases into words. But however we begin, we soon arrive at what must always be, for the beginner, the unit of meaning and of mastery, the word. Words are the counters with which we play the reading game.

The usual procedure is to teach from fifty to a hundred "sight words," that is, words recognized by sight as so many different objects would be; and at the same time start exercises for the training of the ear, pronouncing *Cora*, *Fannie*, the names of objects, etc., in such a way as to bring out the first sound and finally isolate it. After a

few weeks, enough consonant sounds and phonograms have been studied to give real aid in working out new words. The general process of mastering new words so as to introduce but one difficulty at a time may be diagrammed as below.

Sight Words	*Phonic Parts*	*New Words*
rat, can	r at; c an	ran, *studied as* r–an; cat, " " c–at

The work in phonics is kept up through the second grade and, often, well into the third, making ready for the use of the dictionary in the fourth.

From sensori-motor to high-level bonds. — In beginning reading, a printed word is a stimulus that must set off three kinds of bond: the reader must (*a*) recognize the word, (*b*) pronounce the word, and (*c*) get the meaning of the word. We can illustrate in this way. Suppose a little girl sees a soldier with a blue hat-cord. She may recognize the blue cord, know that she has seen others like it, and yet not be able to name the color or tell what it means. Or she may take the second step, naming the color, and still attach no significance to the cord. Finally, she may recognize the color, name it, and know that it means "infantry," recalling at the same time memories of her visit to an infantry camp.

We must take special pains with this third kind of bond, the word-to-meaning bond. Sometimes we try to supply meaning by using other words, or we tell an older pupil to use his dictionary. This may often help. But if the little girl has not visited the camp, it will not help much to tell her that "blue indicates infantry." She may even

think it has something to do with *infants*. G. Stanley Hall (in the study above mentioned) found the children saying that butterflies make butter, or that it comes from buttercups, that grasshoppers give grass, kittens grow on pussy-willows, and honey comes from honeysuckles.

If we were to outline the steps by which we can pass with greatest ease from concrete to abstract in building a word-to-meaning bond, they would stand somewhat as below.

1. Word used in presence of object or experience.
2. Word used in dramatization of original situation.
3. Word with picture (perhaps moving) of object.
4. Word dwelt upon when read, with suggestions to call up vivid mental pictures, concrete ideas.
5. Word read rapidly, giving a quick flash of meaning.[1]

The inclusive unit in reading. — For words following each other in single file we would seem at first sight to need bonds arranged in series. The fact is, however — and it is one of the biggest facts in all teaching of reading — that the key to skill lies in the mastery of inclusive units, of groups of words. We can illustrate this best, perhaps, in the case of oral reading. If one attempts to look at each word and pronounce it before gathering in the next with the eye, his reading is pretty certain to be mechanical, jerky, balky, and without expression. This is likely to be the trouble with those children who are said to be mere word pronouncers and not real readers. If one is to run an automobile smoothly, or read smoothly, or do almost anything else smoothly, he must be looking ahead. Eye and voice can no more travel at the same rate of speed in reading than the chauffeur can keep

[1] For an account of meaning, see C. H. Judd — *Reading: Its Nature and Development*, Chs. II and IX, or D. W. La Rue — *Psychology for Teachers*, Ch. X.

his eyes on the wheels. The eye must go ahead and scoop in the phrases quickly, delivering them (so to speak) to the voice as fast as it is ready to utter them. A good oral reader, like a shorthand writer, must carry on a double process, and a very complex one. The stenographer keeps taking in through his ear a flow of words from the speaker, while his pen comes along a phrase or so behind and puts them out on paper. The reader keeps taking in through his eye a flow of words from the page, while his voice comes along a phrase or so behind and puts them out into the air. It has been found that the eye is usually ahead of the voice by from three or four to seven or eight words; more just after a period, and less and less if the eye is blocked by difficult words, until the voice catches up completely.

Mastering the inclusive unit. — Studies in the learning of telegraphy, and typewriting, and everything else of the sort, show that there is first a *letter* stage, and then, as the bonds go on working better and more coöperatively, a *word* stage, a *phrase* stage, and in the case of the very skilful, a still-larger-unit stage. In fact, the size of the unit that can be handled as a unit is the royal mark of skill. Binet recognized corresponding stages in the reading of French children, and thought it wise to base on such a gradation a measuring scale for reading.[1] As a matter of fact, these stages of progress are found in the reading of all children, but our improved American method tends to cover them up.[2]

[1] Alfred Binet — *Les idées modernes sur les enfants*, p. 26.

[2] There are some writers and teachers whose words and methods seem to indicate that they believe a child never should be made attentively conscious of letters, or sounds, or words, but that he should be encouraged to attempt some kind of plunge from his state of inexpertness to the method of the expert, forgetting words as such and going directly to meanings from the start. One might as well tell a beginning dancer not to think about his steps, but to swing

This improved method introduces but one difficulty at a time by separating the work of the eye and the voice. "Read it to yourself first, and then look at me and say it. If you need any help, tell me." Such is the common direction — the teacher giving so much help as she thinks is wise at that time. The pupil reads his short sentence silently, then voices it with good expression. Gradually, dramatization and oral composition make the talk work easy; and still more gradually, as more and more words are drilled upon, as phonics are mastered, and as old and easy pieces, full of familiar phrases, are read, the eye learns to skip nimbly along the line, until at length eye and voice are so well trained that both can work at the same time and the pupil can "talk out of a book."

Work first for accuracy. — In mastering this process of prevision in reading, the pupil should be neither hurried nor allowed to dawdle. We should make very clear to him, partly by doing it ourselves, just what a good reader has to do, *keep his mind on this goal,* and then have him work most of the time for accuracy — reasonable childhood accuracy — and only occasionally push him for speed. But rejoice, O Teacher, when he begins to "rattle it off" to show you how fast he can go. He has mounted to a higher level, and is reveling in the luxury and freedom of phrase mastery.

Oral reading, if given more than a small amount of practice in the upper grades, is sometimes condemned because of the

into the full waltz from the first, or tell the young violinist not to think of his bow or his hand, or his finger board, but just strike up and play tunes. In the conscious stage of learning, we want as much healthy, directive attention as we can get on each item, one at a time. Later, the skilled performer can "forget all about it"; but the learner who attempts to plunge through and skip the conscious stage is a blunderer, and the teacher who encourages such a performance is — not so skillful as he might be.

supposed necessity of fixing the eye rather slowly on word after word. I cannot see that either oral or silent reading necessarily has anything to do with this phase of the subject. One may gather words by large or by small units when reading either way. Certainly, good oral reading requires the largest possible inclusive unit. "Look up from your book and out at your audience just as often and as long as you can," so the good teacher directs the upper grade pupil: "Scoop up a big eyeful and then say it off to us just as if you were talking to us."

Judd has made the excellent suggestion that primary reading books be "printed with meaningful phrases separated from each other by spaces wider than those between words so as to induce in learners the habit of seeing phrases." This would give a kind of punctuation by spacing, would make our print look like our talk (if one may put it so), and ought to help both silent and oral reading.[1]

Readiness. — Since reading is the verbal re-living of life, there are in it as many sources of interest as there are in life itself. We can call attention here to but a few.

Rousseau makes his little educational hero, Émile, receive "notes of invitation for a dinner, a walk, a boat-ride, or to see some public entertainment." There is no one to read them until too late — the affair is over. Émile then picks up a little reading and at length receives other notes. "Finally, after a great effort, the half of one note is deciphered, and it speaks of going out to eat cream to-morrow; but where or with whom, no one knows. What an effort is now made to read the rest of the note!"

There is the point: reading is the road to what we want, and our first grade friends can be made to feel it very

[1] Charles Hubbard Judd—*Reading: Its Nature and Development*, p. 152.

keenly. And if one cannot read, there is the sting of disgrace. A young man of about twenty-seven found himself called upon to read aloud, before the lodge to which he belonged, a part of its proceedings, and was forced to confess himself unable to do so. He felt the humiliation so keenly that he at once hunted out some one to teach him to read. He became later a prominent superintendent of schools.

The forces that most rally or retard the reading of children are the story, the teacher, the method, and the book. Let us glance at each.

The story. In days gone by, there has been quite a contest between "content readers," that is, readers that laid the main stress on the story material, and "form readers," which sacrificed story interest somewhat to secure a better graduation of phonics and other forms of word study. The content reader has won. Or more accurately, authors have found it possible to produce fine stories for little people without using more than five hundred or six hundred words in the whole first year's work, and to build up this reading vocabulary very gradually and according to phonetic relationships.

When you find, in the reading period, the pupils curling the pages of the primer, rolling pencils, and pulling playthings out of their pockets, in spite of all the efforts of the teacher, the chances are that there is something the matter with the story. It is said in the apple market that "'the mouth merely eats the apple; the eye buys it." The child merely reads the book; the teacher or the superintendent buys it. When McGuffey was writing his good old readers, about the middle of the last century, he called in the children of the neighborhood and tried out his literature on them. It would be well if we could still have committees of children to help in making selections.

Children have an instinctive interest in animals. In grades one and two, the animal story is the favorite, and ranking close to it are stories of home life and familiar things, of toys and parties and Christmas and vacation doings — just such as the little folks have lived through or, if they could, would like to live through. In the third grade a new interest blooms, the interest in fairies; and in the fourth appears another love, that for myth and adventure.

The teacher. The teacher's manner and her reading are of chief importance. If her interest drones, the reading of the pupils will drone, too. In this expressive art of reading, what the pupil catches by reflex influence is very large. You will see classes almost transformed merely by the teacher's getting up, making a few suggestive gestures, and showing by voice and eye that she has caught the spirit of the story and is living and enjoying it.

And if she can read — read with her eyes off the book more than half the time, read so realistically and expressively that it makes the tingles run up and down thirty little spines — then she can motivate the reading lesson mightily.

The method. As you would expect, the method must be such as to rouse the instincts, abilities, and old habits. Dramatizing appeals to play, and to the instincts for movement, rhythm, and vocalization. (It is well if the teacher is a bit of an actor. She will then fall more easily into the spirit of a child's dramatization.) Curiosity is whetted by the plot of the story — for most stories for children should have plots. "We must find out what happened next." Self-assertion is of course always at work. A first grade child of low mentality but strong physique took home a book and compelled her elders to help her read thirty or forty pages an evening. She advanced to the *A* section of the class and

held her place there. Phonic drills are supposed to be killing; but I have seen them conducted so well as a game that pupils were willing to give up their play time in order to go on with it.

The book. You are no longer in the baby class when you carry home a book! The first grader will strap up three or four if he can get them, and carry them home, just to gain caste. But it is probably best that the daily reader does not go home, for somebody there will read it through and again. But there ought to be plenty of supplementary readers and library books at hand; and the teacher soon learns the trick of reading a little way in one and then asking, "Would any one like to take this home and read the rest of the story?" A score of hands fling up reply, a score of voices (if permitted) answer "I."

But we must see that all books, both for home and school use, are good books, standard as to illustration, and paper, and type, and every other essential point. What with persistent school boards and compliant publishers, we seem likely hereafter to have little trouble about such matters.[1]

Does oral reading kill interest? — Oral reading is sometimes ridiculed [2] as fatal to interest because all have the

[1] By addressing the American Type Founders Company, Jersey City, New Jersey, you can procure *An Essay on Prevention of Eyestrain*, showing the sizes and styles of type appropriate for readers of various ages. The Bureau of Reference, Research and Statistics, Department of Education, City of New York, furnishes a very instructive list of *Tentative Standards for Text Books for Pupils' Use in New York City Public Schools.*

[2] Let me advise the young teacher not to fear ridicule. It is the favorite resort of the "smart set" in education who pride themselves on having "the latest ideas" and are a little fond of putting everybody else out of countenance. Beware also of the educational lecturer who substitutes ridicule for reason. He is very often more ridiculous himself than anything at which he points his weapon.

book, know just what is coming next, and still must keep their eyes on the line while some "unfortunate victim" struggles through, only to be crucified on a cross of criticism at the close. But it is easy to find classes where children would leap from their seats, if discipline did not restrain them, in their eagerness to be the "unfortunate victim." As for knowing what is coming, if that is objectionable, we must eliminate all preliminary story-telling by the teacher, and all preliminary dramatization. Children repeat, and love to have repeated, by the hour, the good old things. You knew what was coming when you attended the Shakespearean play, when you sat down to read "The Lady of Shalott," when your classmate demonstrated the *n*th proposition in geometry, or your mother served oatmeal for breakfast, or ten athletes in succession tried the long-distance jump. Is it a bad method, in a foreign-language class, to let all have the book and follow with the eye while some one translates or reads aloud? One object of reading is to increase vocabulary, and the very best way to learn a word is by using both the eye and the ear on it at once. Further, children, like the lower animals, do learn sometimes more from each other than they can from the teacher. They undoubtedly receive great help from hearing each other read. We have also found expert teachers of certain branches (drawing, for example), asserting that children — and they may all have drawn the same thing, so they "know what is coming" — often learn more from criticisms and suggestions given by each other than they do from those given by the teacher. All that is necessary is that the criticism be animated by the spirit of helpfulness. This does not mean that individual work should not be done also, nor that bright

children should be compelled to mark time while dull ones advance.

Exercise: the tandem method in reading. — Huey, in his admirable discussion of "Learning to Read at Home," [1] speaks very highly of what we would here call an approach to the tandem method. It might also be called the "mother's knee method." The children grow into reading as they learn to talk and usually become "the best and most natural readers of all." (Let us remember this in our talks with parents.) "The secret of it all lies in parents' reading aloud to and with the child." The little one follows the pictures, finds "where it says" so and so, watches the parent's finger as it points along the line, learns to keep his own finger "on the place," gradually comes to recognize a few of the outstanding words, memorizes jingles, and at length is able, with the help of pictures, etc., to make out new jingles and stories for himself. "He likes, too, to sing his favorite songs along with mamma, from the printed page, and learns to read these readily in this way."

The typical school exercises. — As a rule, do not feel that there is only one way to do a thing. Opinion and practice differ much as to whether the teacher shall, in the beginning, print or write on the board, when the pupil shall first use a book, just when to introduce phonics, and so on. But if you are clear headed as to just what you are trying to do, and very much in earnest about it, you may invent a better way of doing it than any now in existence.

One very good and very common way of starting the work at school is to tell the class a story, preferably the first story in the primer, so as to give practice on the very words they are to meet in the book. The children may then tell

[1] *The Psychology and Pedagogy of Reading*, Ch. XVI.

the story to class and teacher. Most teachers then prefer to have the pupils play the story, that is, "dramatize it" simply. At any rate, it is talked over considerably, after which two or three simple statements are questioned out by the teacher and printed or written on the board. The mother wit of the pupils enables them to tell "where it says" this or that, until at length a few phrases or few words are isolated and partially mastered. Before many lessons are over, there are enough words in the treasury so that the work in the book can begin.

Getting the story and enjoying its repetition are, of course, the motives always at the top of the child's mind. To you, as teacher, the aim will be "reading for the meaning." As aids to this ultimate object, the chief exercises to be conducted are (1) the drill on sight words and phrases, (2) the study of phonics, (3) the application of phonics to the mastery of new words,[1] (4) reading for expression, and (5) the mastering of large inclusive units.

Beyond what has already been given, we cannot here discuss these processes. In the teacher's manual of any good system of reading will be found guidance that is "positive, definite, and detailed."

As the reading book is usually the first book that any pupil undertakes to study alone, special attention should be given to preparing for this momentous step. But if the book is a good one, the transition will be very smooth. Teacher and pupil will already have worked together through many a happy "study-recitation," the teacher doing ever less and less and the pupil more and more. He is likely to show quite clearly when he is getting ready to try his wings. We must see that there are no unusual word difficulties or

[1] For the use of the dictionary, see the chapter on Literature.

involved meanings ahead to wreck him. We must give him a hint, perhaps, as to what is coming, and let him fly.

Oral and silent reading in the reading class. — It has often been stated that, since in after-school life there is so much more silent than oral reading, silent reading must be taught in the schools and must receive, as soon as the mechanics of reading are mastered (say from the third or fourth grade on), much more time than oral reading. To both of these statements I demur: silent reading has been taught for untold years by good teachers as both incidental and preliminary to oral reading, and it is already receiving about 98 per cent of the pupil's total reading time.

As previously described, the child is taught from the very beginning to read each sentence silently before he attempts to voice it. This is also teaching him to study. Later, when he can study alone, he goes over the whole lesson silently (but not slowly unless the piece is difficult) in preparation for his oral reading. As to time, we may figure that if an upper grade pupil spends five or six hours a day in school, he probably sits at his desk, reading silently, during periods amounting to two hours. To this we may add an hour of silent reading at home. On the other hand, if a period of forty minutes is given to oral reading, each of a class of twenty can have no more than two minutes during which to exercise his voice in the expression of the finest sentiments that have ever found form in the English language. Not poetry only, but much else in our literature, is akin to music. It *can* be read and enjoyed silently, but it has its most pleasurable and uplifting effect when it is voiced. Oral reading, with the conversational discussion that so fitly accompanies it, is one of the most valuable

moral-social exercises the school can maintain. The time given to it should if possible be increased.

Silent reading as teaching to study. — Everyone reads different kinds of material, literary, scientific, etc., at a different rate. One who reads a novel rapidly may slow down when he attempts a medical article or an arithmetic problem. It is not primarily a question of eye movement or of lip movement, but of brain action; and as there is a bond for everything and everything has its bond, we should practice on the very kind of matter we wish to perform on. What most students need is practice in grasping the important thoughts in what they read silently. Such thought-getting means rapid reading. Teaching silent reading should be thought of rather as teaching to study, and the place to teach it is in the very class in which the studying is to be done. The silent reading of arithmetic should be taught in the arithmetic class, of music in the music class, and of science in the science class. Beginner's silent reading (as previously described), together with the outlining, etc., of literature, we should continue to teach in connection with reading.

Effect. — Probably it is easier to bring about an agreeable effect in reading than in any other branch; for there is no interest in child life which cannot secure through it some degree of satisfaction. The social environment also reenforces us strongly, for while it will tolerate a great deal of bad language and general ignorance, it points its finger at one who "can't even read." If reading is not begun until the pupils are ready for book work, if the "stories" are good and well graded, if the teacher is adaptable and does not rush her class to keep up with some externally imposed standard or with competing grades, there is likely to be no trouble.

Standards and tests. — First, what is the ideal as to speed? Much depends on whether we want our knowledge to be thorough, and how long we care to keep it. We willingly pay a large price for goods that last a long time. A celebrated English lawyer, on being asked the secret of his success, replied that he resolved, when beginning to read law, to make everything he read thoroughly his own; that many of his competitors read as much in a day as he did in a week; but that at the end of twelve months, his knowledge was still fresh while theirs had glided away. Romanes tried out the reading rate of various highly distinguished men in science and literature and found most of them to be slow readers. He also found that each individual has his own characteristic rate of reading, which, he concluded, depended on their inborn rate of brain action, and not on "any merely accidental differences arising from greater or less facility acquired by special practice." [1]

Another of Romanes' findings was that those who naturally read fast retain more (temporarily at least) than those whose rate is slower. On this fact has been based the superficial conclusion that children should be speeded up in their reading so that they too will retain more. Tilden may be fast in tennis, and the Mayo brothers in surgery, but the beginner can do nothing worse than to attempt a speedy game or a speedy surgical operation. It is also true that those who memorize fastest remember best, for nature has given them better memorizing machines; but this does not mean that every man's memory machine will do better work the faster it runs. Every careful study of learning has shown that the earnest learner who fixes his mind on accuracy and lets speed, for the most part, take

[1] George John Romanes — *Mental Evolution in Animals*, Ch. IX.

care of itself and come as a by-product, finally excels not only in accuracy but in speed also. Further, our "rapid silent reading" may be only rapid silent cramming. Lincoln, when a new thought came, "bounded it north, and bounded it south, and bounded it east, and bounded it west." Our rapid "reading for thought" may be only reading for a flash of ideas, a kind of substitute for the moving picture show, reading to *escape* thought.[1] Until it is proved that, among children of equal intelligence and native reading ability, there is greater permanent acquisition and actual use of what is read among those who train for speed, we must regard the rapid methods as quite possibly a dangerous infraction of the speed law.

The whole matter, as I see it, may be summed up this way: Each has his own inherited rate of reading, and tendencies as to forming associations while he reads. He should be trained into his natural speed and habits gradually, and chiefly by methods that stress accuracy. He should be shown how rapid readers attain their speed, and be given opportunity for extensive reading along the line of his choice.

The rate at which a pupil reads can be measured sufficiently for practical purposes by starting him off by the watch and calling time at the end of, perhaps, three minutes, at which time the words can be counted. If the reading is silent, the whole class can be measured at once, each counting the words from his stopping place back to the common point of beginning. Questions, oral or written, will give a fair idea as to the thoroughness of the reading. More accurate measurements can be obtained through the use

[1] See, in this connection, Nellie E. Turner's excellent discussion in *Teaching to Read*, Ch. XV.

of standardized tests.[1] Approximate standards of speed per minute for the several grades are given below.

	Grades							
	1	2	3	4	5	6	7	8
Oral Rate . .	90	108	126	138	144	168	186	208
Silent Rate . .	90	108	126	144	168	192	216	240

The quality of oral reading, while not hard to judge roughly, is difficult to measure accurately. The phonograph can furnish us graded samples of oral reading to serve both as standards for measurement and for inspiration. Reading is not the getting of ideas merely, but of feelings also. To a skillful teacher, oral reading constitutes the best of all tests for determining how much of a selection a pupil has really assimilated into his personality.

CLASS EXERCISES

I

Below are a few Greek sentences.[2] Look them over and see whether they are "all Greek" to you.

1. ἐν τῇ κώμῃ ἦσαν μῖκραὶ σκηναί. 2. αἱ μῖκραὶ οἰκίαι κακαὶ ἦσαν. 3. αἱ σκηναὶ καλαὶ ἦσαν. 4. ἐν τῇ κώμῃ μάχῃ φοβερὰ ἦν.

Do you think a child has feelings similar to yours, as he faces a page of strange symbols? Try to find the same word in several places, perhaps in slightly changed form. By what signs do you

[1] Tests for the measurement of reading may be obtained from the Bureau of Educational Research, Urbana, Illinois; from S. A. Courtis, Detroit, Michigan; from the Bureau of Educational Measurements and Standards, Emporia, Kansas; from the Bureau of Publications, Teachers College, New York City; and from the University of Chicago.

[2] From Lesson IV of *The First Greek Book*, by John Williams White; published by Ginn and Company.

recognize it? What do you think would be the best method for learning some of the words as sight words? What help should you expect to get from phonics? What would you need to enable you to master new words? (The Greek language is much more nearly phonetic than ours.) Do you think that when you had mastered the word forms you could read expressively without knowing the meanings of sentences? What is necessary in order to enable you to keep eye ahead of voice in oral reading? To enable you to master large inclusive units?

II

Let each read or tell a short story as he thinks it should be presented before the grade of his choice.

From the examples presented, and from any other sources of information you may have, make a list of the "Essentials of a Good Story for Children."

FOR FURTHER STUDY

1. What is your definition of reading? Why do you like this definition better than others? Does it give any guidance as to the proper method for teaching reading?

2. We have decided that we will not try to bring the children to the expert stage in writing, or drawing, or even spelling. Should we try to make them expert in oral reading? Silent reading? Why or why not?

3. Doctors tell us that health and vigor depend not so much on how much we eat, as on how much we assimilate. Is there anything analogous to this in our reading habits?

4. How comes it that in spelling, children are helped by moving their lips, studying aloud, etc., whereas in reading (beyond the beginner's stage at least) they are said to be hindered by it? (See what differences you can discover between the two processes, especially the difference between feeling that you are "talking to yourself," and feeling that you are talking to an audience which must be properly impressed and may be critical.)

5. Mention some means by which you would try to get children to like and seek much good literature.

6. Can you remember your experience in learning to read? If so, how, if at all, would you change the method used in your case?

7. If you have had any experience that may prove helpful, such as the reading of shorthand, or the telegraph code, or perhaps a foreign language, give others the benefit of it. What stages of development do you discover?

8. Suggest some of the exercises you would use in order to teach a child a sight word (that is, a word to be taught as a whole and not phonetically analyzed).

9. Show, by giving successive steps, that composition and reading are the reverse of each other.

10. If possible, examine several sets of reading books, especially those for the lower grades. Select the series you think the best and give reasons for your selection. What do you look for in the ideal reading book?

11. What is the value of oral reading as a language exercise, especially when the selection is easy to read? (Consider the introduction of but one talking difficulty at a time by having words all supplied and phrases formed.)

12. What would you think of having each pupil in the seventh or eighth grade bring a newspaper or magazine and read from that in the reading class? Do periodicals furnish good material for silent reading? Why or why not?

13. Though we teach good penmanship in the penmanship class, it often fails to "carry over" to other classes. If we teach silent reading in the reading class only, is that likely to carry over? Should we not have a certain amount of oral reading in other branches?

14. Where do we get most of the new words that we add to our vocabularies? Discuss reading as a means of increasing vocabulary. Those children who read much silently and not much orally are said to pronounce badly. Can you see any reason why this should be? If it is true, how can we correct it?

15. What attention should be given to the reading of script? Would you advise having a certain number of pages of script in reading books?

16. Good newspaper reporters are expected to put all the essentials of the "story" in the first paragraph. Good writers of all literature quite commonly open each paragraph with a "text sentence" and close it with a summarizing sentence. Show how these facts help us in silent reading, or skimming.

17. Why do people like to open their Bibles and follow with the eye while the minister reads? Can a child get any similar experience from a piece of literature which another is reading?

18. Tell some things you would do to secure good expression of what is read. What should be the effect in expression of turning back to a favorite old piece, now grown easy to read?

19. Huey found that the rapid reader is marked (and in the order following) by excellent visual perception, practice from childhood, power of concentration, mental alertness as shown by rapidity of original composition, and scholarly ability as shown by college records. (*Op. cit.*, p. 174.) Which of these seem inborn chiefly and which acquired chiefly?

20. How fast can we understand by ear when listening to a lecturer, a radio broadcaster, or a good phonograph? (The average lecturer speaks from 125 to 175 or rarely 200 words per minute.) Can we understand, at that rate, anything that requires much thought? Do you think we can understand any faster when the words come to us through the eye? Why or why not? What does this have to do with our ideal of speed in reading?

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CHAPTER XV

Music

Exercises. — 1. Which would you prefer, to have a pupil finish his music course with a fine voice which he uses habitually in conversation, but with poor achievement in the reading of music; or to have him graduate from music able to read it with ease and perhaps sing well, but with a disagreeable conversational voice? Why? Do you know of any good singers whose conversational tones are faulty?

2. Go through the chapter on Reading, and then through that on Composition and Elementary Grammar, making note of all the points where you think a parallel should appear between the teaching of music and the teaching of these subjects. Note also points of difference which you think should give rise to a difference in method. Be ready to report.

"Can I teach music?" — In regard to music the case of many teachers is much like that of the athletes Virgil tells us about: "They can because they think they can." In the teaching of music, some cannot because they think they cannot. Music has come into the schools more recently than many other branches; and so not all of us have grown up through several years in that as we have in reading and arithmetic. Consequently, we suspect it of all sorts of difficulties, and fail to realize how simple the essentials really are.

Music can be taught by anyone who can sing the scale and who can tell when others, notably children, are not singing it. Indeed, I have known teachers who could not

sing even that much, yet who were able to teach vocal music successfully, in fact much better than some who sang with ease. They did it by letting the more musical children lead in the practice. The necessary theory, notation, etc., like a simple problem in arithmetic, can be mastered by anyone, singer or non-singer. The untaught teacher can even teach herself, working ahead of her class and picking up her knowledge as she goes — though the picking up business is of course rather bad in any branch. But there are many roads to success: the phonograph and the piano never refuse their aid; the supervisor may give special help; some musically minded enthusiast in the community may come to the rescue if welcomed; or one may escape by trading work in music with a neighboring teacher for work in some other subject.

Why music? — A traveler in Norway heard a sweet voice singing, and ventured to enter the lowly house from which it sounded. He found a peasant woman singing to her newborn babe. Said she, "I wanted music to be the first thing my baby should ever hear in this world." Over the grave of the great musician Lassus (whose name means literally "weary") was placed the inscription *Hic ille est Lassus qui lassum recreabat orbem.* ("Here lies that famous Weary One who refreshed the weary world.") All the way from birth to death we should go, as the old negro song has it, "Singin' all the way, Lord, singin' all the way."

Music may not at first seem to have much to do with "direct self-preservation"; yet P. P. Claxton, when United States Commissioner of Education, said that "among a practical, industrial, and commercial people, like ourselves, good music is necessary not only for enjoyment and recreation, but also for inspiration and for salvation from death

in the din and dust of trade."[1] War shows us how essential is music to relieve and inspire a strenuous life, and it is worth no less in peace. He who can live without it and not miss it is half dead already.

It counts, too, toward indirect self-preservation; for it insures the "wise use of leisure," and many are they now who, in whole or in part, make their living by it. In the "rearing and discipline of offspring" music is a virile force; for vocal music, which was the first kind of music, probably evolved among lower animals and primitive men as a sex call, and all kinds of music still serve as lovers' language. Internationally, it is the most widely understood of all languages, and has throughout Europe and America a common notation. As an adornment to life it is supreme.

In short, the final fact in life is feeling, and music is the language of the feelings. Wherever there is a message of emotion, it is not only well to "say it with flowers," but also to express it in music.

Situations and responses. — Almost every situation is a musical situation. Even in school, see how music thrills its way through all other branches. It enlivens literature: a poem is still more poetic when it is sung. Among the early Greeks, music and literature were not two branches, but one. In geography, the spirit of far-away peoples comes floating to us through their songs, as in history the soul of bygone times is made immortal in its music. We almost know the negro when we know his melodies, and a boy may catch more of the spirit of '76 from "Yankee Doodle" than he does from seventy-six pages of history. Music and physical culture are boon companions, not to be separated. We even sing the multiplication table.

[1] *Bulletin No. 33, 1914*, of the Bureau of Education, p. 5.

Let us list the responses: to listen to and appreciate music, to sing, to play an instrument, to read notes, to compose music. Our most progressive schools are including all of these in their programs. Music in public schools, however, is usually vocal music; for a larynx costs nothing, being furnished by nature; and further, we all play the larynx more than we do any other instrument. But the time is coming when every child will have the chance to learn, in school, the piano, or violin, or any other standard instrument he may choose. Some school districts already provide instructors in instrumental music, and furnish instruments, requiring only that a class of minimum number be formed to take advantage of their services.

Music has its literature, its classic compositions, as English has; but there are not so many of them, nor are they so long, nor is it so necessary to be able to read them for one's self; for while it would not be easy to get the English classics by hear-say, it is very easy and agreeable to get the musical classics by hear-sing and hear-play. So, also, musical composition corresponds to English composition; but as there appears to be less daily necessity for it, we spend less time on it. Music is a language of feeling rather than of ideas. We might compose a little melody and post it to a friend, so that when he sang it or tried it over on his piano he would know how we felt; but when we wish to express our sentiments, we can usually find some ready made composition, "Annie Laurie," or "Sweet Summer's Gone Away," or what not, into which our feeling will fit very well.

The school has given most of its attention to singing, and to the reading of vocal music, and on these phases we shall concentrate here.

What reactions, and to what stimuli? — Three things stand out, Voice, Scale (sung but not seen), and Notes (more accurately, Notation).

Voice first. We take careful thought to make dress and face beautiful. The tones that issue from our faces, our vocal personality, should be no less so. If everyone could be compelled to speak into a dictaphone for an hour and then listen to himself, it would lead to a great deal of reform. If we can get our pupils to speak musically, we have succeeded royally with our vocal music — beyond praise.

Knowing the scale means that when any note of it is sounded, as *la*, or *mi*, the pupil can then sing all of that scale, from high *do* to low *do;* also, that he can jump from any note of that scale to any other note at will, singing *do-sol*, or *la-fa*, or any other combination requested. The tones have then taken on what the musicians call *tonality*, that is, the feeling that they are just so far above or below certain other tones.

Finally comes the reading of that peculiar notation which has grown up with the history of music, each note in proper pitch, rhythm, and time, and the whole sounded with suitable expression. In the simpler selections, our pupil should be able, given his key pitch, to read at sight both music and words together.

What responses are ready? — As to *voice*, all children under twelve are sopranos (though some, owing to adenoids or other ailment, may not at first seem to be), and so should sing the higher tones and not the lower ones. The larynx grows rapidly until the age of six, but does not change much after that until comes the change of voice at the period of puberty.

As to *scale*, few if any six-year-olds will know it as such; but many of them will be found able to carry a tune, if the tune is not too heavy. Music, like language, comes at first wholly by imitation. To hear and to utter are almost one process, not with gossips only, but among all mankind. Ear and vocal cords are so closely connected as to constitute, for some purposes, almost a single sense organ. Consequently, the children who have heard much singing are very likely to have done some. And again consequently, most children are able to "match tones," that is, to sing a tone like any that is sung to them if it is within their range. However, there may be found quite a fraction of first graders (and of higher graders if they have not previously had music) who go on responding with the same tone no matter what note is sounded as stimulus, and so are called "monotones."

But nearly all monotones can be trained to sing, and usually within a few months. Cases that do not respond to training should be referred to the school physician, as the difficulty is often due to nose, throat, or lung trouble. Only one or two in a hundred lack the essential kind of ear, or larynx, or bonds between them, and so cannot be taught to sing. Such "tone deafness" seems to correspond to the "word blindness" which sometimes prevents reading.

Our pupil's experience should have given him a start, too, in the appreciation of rhythm, so necessary to song whether by ear or from notes. And finally, whatever else he has or lacks, he is pretty sure to have feelings, emotions, and these are to vocal music the very river of life.

What relation have music bonds? — Few music bonds are simple and single; every tone and every rest relates to

that which stands with it. In fact, this is exactly characteristic of music. Few of us can remember an absolute pitch, any more than we can keep in mind an absolute color well enough to go to the store and match it. We must have a sample with us. Just so, if we sound *do* without an instrument to-day, it is not likely to be the same note, when tested out by a piano, as the *do* our brain cells put forth yesterday. We must have a sample, as from a pitch pipe, to start us.[1] Using this as a standard, we can jump from it to other notes. In music, we think in terms of "jumps," intervals between notes.[2]

When we teach a melody, a tune, or the running up and down the scale, we are forming bonds in series, a comparatively simple matter for one who is safely out of the monotone class. Singing the various intervals of the scale may be thought of as mastering a great trunk line bond from which all tunes branch off as variations. But as in reading English, so in reading music, the inclusive unit is essential. Eye must travel ahead of voice. And singing introduces, sooner or later, a double difficulty; for the eye must pick up both words and notes.

This means practice, practice almost "without stint or limit," and for each and every pupil who is expected to learn. But there never need be more than one difficulty at a time, for the work in music can be graded to the inch, so perfectly that the pupil feels he is moving along on the

[1] "Absolute pitch" is defined by Gardner as "the ability to recognize and intonate any tone indicated." He recommends that the student carry on his person a tuning fork (A at 435 vibrations) and sound it as often as opportunity permits. In this way many can acquire absolute pitch. (Carl E. Gardner—*Essentials of Music Theory*, p. 51.)

[2] If you are not very familiar with the theory of music, it will be well for you to turn now to the latter part of this chapter and read the Appendix.

level rather than up grade. And although the words are an added difficulty, it is found that vocal reading adds, among other things, a push to the work in vocal music.[1]

From sensori-motor to high level. — In the study of reading, we found that a child should have a deal of sensori-motor experience, and do a deal of talking about it, before he attempts to read. Similarly, he should have a deal of sensori-motor experience and do a deal of *singing* about it before he is expected to interpret symbols, either in the form of printed notes or the oral note-names. He must form ear-voice bonds first, as in language. Then he can hitch the eye-bonds onto these old tracks, as in teaching reading. The general course of the pupil's progress in vocal music is from songs to notation, and then from notation back to songs, just as in reading he passes from story to printed page and then from the printed page learns to get his own stories again.

In practice, this means that we must teach first a great many songs by imitation, "rote songs." *From rote to note* is the motto. The repeated singing of such songs helps to fix, by a sort of drill that partakes of pure joy, tones, intervals, rhythm, and expression. As talking leads to the inner speech of reading, so the rote song leads to what may be called *inner song*, so essential to the reading of music. One must learn to get the feeling before singing it, just as one must look ahead and catch an idea before reading it aloud.

Teaching the scale. — Half the time given over to the subject during the first year, perhaps, will be spent on rote

[1] Says Dr. Hollis Dann, "Good oral reading is the greatest possible help to school singing; therefore, the music supervisor and teacher should assist in every possible way in bringing about the correlation of Music and Oral Reading from the first grade through the High School." — *Hollis Dann Music Course, Manual for Teachers*, Book II, p. 6.

songs, for they are easiest and most interesting to learn. But the scale fixes the bonds that occur most frequently, and prepares the way for most other bonds-to-be. How shall we teach that?

We may introduce a simple rote song whose words merely run down the scale and up again. After this, the pupil may sing *loo, loo, loo,* or *coo, coo, coo,* down and up. He then has only to learn the *do-ti-la* names and he can sing the scale. Next, the teacher should *loo-loo* or *coo-coo* in one direction or the other, until the pupil can tell with ease which way she is going. All is then ready for writing the scale on the board and reading it off again.

In general, as just illustrated, the steps are (1) Imitation, (2) Recognition, (3) Representation, (4) Interpretation.[1] This means (1) "Sing what the teacher has just sung," (2) "Sing the syllable names for the tones that she has just *loo-loo-ed*," (3) "Write (or learn to write) what we have sung," and (4) "Sing what we have written, or something else that is no harder."

Interval should be studied by the same plan. The easiest interval to recognize is the octave jump between low *do* and high *do*, and after this the chord intervals such as *do-mi, mi-sol, sol-do.* An easy way to introduce such an interval as *do-mi* is to write the two notes in their places on the staff with a light little *re* between them, barely touching the latter with the voice in passing it, and then omitting it altogether. Intervals of a second (from any note to the one next to it) can be drilled by singing *do re, re mi, mi fa,* etc., or *do re do, do re mi re do,* and so on till the top of the scale is reached, when the process may be reversed.

[1] This statement of steps is taken from the article on "Music," by Mary Reid Pierce, in *Public School Methods,* Vol. III.

Tonal vocabulary. — In drawing, the pupil has his "graphic vocabulary," in reading and composition his vocabulary of words, and in music his tonal vocabulary. What is the unit in vocal music which corresponds to a word in reading? It is a jump, an interval between tones. But the size of this vocabulary of jumps is very limited as compared with verbal vocabulary; for within the major scale it is only possible to pass from each of 8 tones to each of 7 others, a total of 56 different jumps. A singer is expected to cover a range of about two octaves wherever his voice lies on the great staff, and we must also consider all the half tones of the chromatic scale; but even these additions leave the total tonal vocabulary comparatively small.

Tones and notes cluster into phrases, as words do, forming inclusive units for both the ear and the eye. One can hardly hum any three tones at random without being reminded of a part of some old song. The more we sing, the more wealthy we become in tonal vocabulary.

What further difficulties? — Rote songs taught and the mastery of the scale fairly well under way, the worst is over. We must still teach rhythm, time (meter), expression, part singing, and (if we are so ambitious) musical composition. The chief value of the last is that it is a means to appreciating and interpreting what others have done. But in each case it is easy to introduce only one difficulty at a time. In teaching rhythm, we can remove all difficulties as to notes and intervals by taking some piece that is simple to read. It helps, too, to remember that there are, in general, but two kinds of rhythm, the even and the odd, the walking (or marching) and the waltzing. Both rhythm and meter should be *felt* first and analyzed for accuracy afterward. Expression, as in reading, comes best with the familiar

pieces, where there is little left to do but express. Part singing may begin with so simple a matter as having each group hold one note of a *do-mi-sol-do* chord; and throughout, the rule, of course, is separate singing of parts before synthetic recitation.[1]

In general, we must take the attitude of coaching a music team — finding whatever our pupils are weak in, and working it up.

Readiness. — Nature has made children ready to sing, and so has saved the teacher that trouble. They are few, from monotone to master, who will not "come out" on the kind of song that appeals to them. But special conditions may balk the work. Perhaps music has just been introduced, and the big boy is shy and half ashamed to be caught performing at it. It may be that his voice is changing. Perhaps the teacher is pushing the technique too fast, and not permitting singing enough. In one school where the girls "struck" on singing, the teacher at length discovered that the boys had told them they did not look pretty when they stretched their mouths for the high notes. (I do not know how this was remedied.)

Someone has classified music as "foot music, heart music, and head music." We can try out these kinds on the children, give them what they want, and gradually lift them, as we do in literature, to a higher level.

Readiness for the individual piece can usually be gotten by "painting the picture." Here we have a lullaby. "Baby is going to Slumberland. All is still. The chickens are on

[1] For details, both as to course of study and methods of teaching, a teacher's manual is needed. Dr. Hollis Dann's *Complete Manual for Teachers* (American Book Company) is excellent; but the work for the pupil is rather advanced in grade (as I think), and should be followed, in the average school, a year or so in the rear.

the roost, and the last little bird has stopped chirping and put his head under his wing. Hark! Mother sings the sleep song, very softly. Show us how."

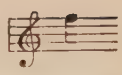
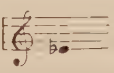
Have your pupils feel that they are singing to you, or let one group or person sing to others. This puts vitality into the tone. "It is this sympathetic quality that pleases when we hear it, although we may not know what it is. Without it, the most perfect voice and most perfect vocal technique is cold and fails to touch our hearts." [1]

The community counts for much in the creation of musical spirit. The Meistersingers of Germany saturated their country with music until sweet song flowed everywhere. We may expect new devotion to music to arise from our community singing and from our National Week of Song.

Exercise. — There is not enough musical exercise. Music teachers rightly demand individual recitations in music as in other subjects, and if possible, daily. Were the value of vocal exercise to the speaking voice more generally understood, there would be greater interest in school singing.

The voice stands first in importance. The teacher must use good voice throughout the day, and in teaching music use the upper tones, even if the teacher is a man who sings bass. As a rule, do not sing with the children, as your ear must be open for their errors. Singing with a good phonograph properly pitched approaches the tandem method if the record is made by a voice suitable for imitation by children. All experts agree that children's singing should be done wholly in light, soft, head tones, so light (as one puts it) that 60 or 70 children, singing in a room with doors and windows closed, would not be heard outside. The range of

[1] *Public School Methods*, Vol. III, p. 366; article by Mary Reid Pierce.

the younger voices should not be above F  nor below E-flat  . To violate these conditions may mean vocal damage beyond repair.[1]

The first lesson. — "Playing engine" is a common way to start. The teacher, guided by pitch pipe or piano, gives a toot (perhaps on the C an octave above middle C) and asks all the children to toot the same way, passing quickly from seat to seat, listening carefully to each, and making a record of those who fail to "match tones." From this time on, the teacher's time will be divided between song work with those who are ready to sing, and special individual work with the monotones. By the end of the year there will probably be only one or two monotones left in a large grade.

Until we can "guide the nerve current repeatedly along the right path" in this way, there should be very little singing with the piano, in kindergarten or elsewhere; for thereby the monotones are wearing deep the wrong paths.

Dealing with monotone and change of voice. — Experts differ as to how to deal with monotones. Some have faith in training by listening, supplemented by individual effort, asking the pupil to think of higher and lower tones, etc. Others stress the pupil's own efforts. Gebhard claims that a cure can usually be worked at once by having a child who can sing stand before one who cannot, directing the poor singer to watch the mouth of the other and imitate him as he sings the desired tone.[2] Other suggestions are to have the monotone imitate the sounds of nature, such as the note of the cuckoo; or to slide his voice anywhere, up or

[1] Hollis Dann—*First Year Music*, p. 9.

[2] See Kendall and Mirick — *How to Teach the Special Subjects*, p. 63.

down, until he hears himself sounding a variety of tones, at least.

It is said that more voices are damaged during the period of change of voice at puberty than at any other time, and that girls, whose voice change is so gradual as to be often unnoticed, frequently suffer worse than boys. The change in the girl is shown by a slight hoarseness, roughness, or huskiness. During this period of change, a pupil's voice may shift rather rapidly, down, and up, and down again, resulting in the singing of alto to-day, soprano to-morrow. If care is taken, it seems unnecessary, during this time of vocal variation, for children to stop singing altogether. *Strain* is the great danger. *Sing softly* is the great precept.

The three essentials of voice culture. — Young children should think little of their throats, or diaphragms, or other parts of their anatomy; they should speak and sing imitatively and let nature do the rest. But as they grow, they can gather much of vocal culture in a very simple form.

There are three essentials to be considered by one who would produce the best voice he is capable of — best as to quality, hygiene, and ease and endurance in singing or speaking. They are (1) diaphragmatic breathing ("breath support"), (2) the open throat, and (3) "voice placement," the centering of the voice at the point (apparently low in the nose or high in the front mouth) where the sound of *m* seems to be when one hums it. Toward this point the voice should be directed whenever it is used for any purpose.[1]

[1] The word "home" is an ideal one for vocal culture: the *h* is naturally thrown all the way from the diaphragm, the *o* opens the throat like that of a singing canary, and the *m* locates the "hammer point" on which the voice should be centered.

It is true, of course, that the accomplished singer or speaker "does not know he has a throat." But he probably knew it once. Many have to grow through a stage of conscious skill. The best age for this period of conscious management seems to be unknown.

Effect. — Effect, like readiness, naturally takes care of itself. Music is its own reward, and one gets, from the beginning, without much labor, a large portion of the kind of enjoyment that is ultimate — the joy of the master. A class that does not take to the technical drill should not be rushed, but may spend more time on musical appreciation, selecting records for the school phonograph, taking up the stories of the operas — gems in themselves — and solving problems based on classic samples, such as "What name would you give this?" or "What does it make you feel like doing?"

Testing essential bonds. — As before indicated, one very practical test (for both teacher and pupil) is the use of a pleasing voice in voicing anything. So far as mastery of the scale and the reading of music are concerned, the course itself can be made largely its own test; for it is a course of *graded action*, and one can tell pretty definitely whether or not the successive acts can be performed by each pupil.

Prognostic tests, developed by Professor Carl E. Seashore at the University of Iowa, have attracted international attention. By means of them he attempts to discover musical talent, especially among school children, and to determine to what degree such talent warrants development.[1]

[1] Those who are interested can procure from the University of Iowa, Iowa City, Iowa, a pamphlet by Professor Seashore entitled *Vocational Guidance in Music;* and from the Columbia Graphophone Company, New York City, a *Manual of Instructions and Interpretations for Measures of Musical Talent.*

CLASS EXERCISE

The purpose of the exercise is to study the relations of the tones in the scale, and especially the relation between the scale as sung and music as written on the staff.

Each should prepare during a study period the work called for and later take it to class.

On a long sheet of paper (or two sheets pasted together lengthwise), draw 24 light horizontal lines with half-inch spaces between them. At the left side of the sheet, letter the lines from below upward as follows: C, C♯, D, D♯, E, F, F♯, G, G♯, A, A♯, B, C; then repeat the series. Now go over the lines again and make heavy those that are marked with a letter without a sharp.

The bottom line represents middle C on the great staff, and each line above, a tone of the chromatic scale, these tones being separated from each other by a half step in every case. The heavy lines mark the tones of the scale of C Major.

On another sheet, draw eight light horizontal lines to represent the scale as sung, from low *do* to high *do*. Make the space between *mi* and *fa*, and between *ti* and high *do*, a half inch. All other spaces should be one inch. An eighth of an inch above and below each line, and parallel to it, cut in with your scissors to the depth of one inch, and trim away so that a little strip one fourth of an inch wide and an inch long stands out where each note lies. Put the syllable names of the notes on these strips, beginning with low *do* at the bottom.

Bring these two sheets to class.

Place lower *do* of the vocal scale map on the lower C of the map of the chromatic scale. Do the other syllables fall on any lines bearing sharps? Why is this? Next, place lower *do* on the G above middle C. Do the vocal notes fall on any sharps? How many sharps shall we expect to find in the "signature" of the key of G?

Place lower *do* on other note-lines and test out for sharps in the same way.

Can there be such a thing as E♯ or B♯? Why? F-flat or C-flat? Why?

If it is desired to continue the study, rename the staff notes for flats. Begin at the bottom and write the names in the middle of the page as follows. C, D-flat (D flatted gives the same tone as C sharped), D, E-flat, E, F, G-flat, G, A-flat, A, B-flat, B, C. Repeat above.

Study the various scales in flats, the scale of F, of B-flat, etc., proceeding as with sharps.

Could we not abolish flats and write all scales in terms of sharps? But we should then have two scales (those of G and of F) written with one sharp each. Etc.

Class discussion may be carried on at pleasure.

FOR FURTHER STUDY

1. Give instances of service rendered by music in daily life — individual and social.

2. What needs to be done, in your school, to improve musical facilities? Is there any way to get this done?

3. Give instances from child life to show that ear and vocal cords "constitute, for some purposes, almost a single sense organ."

4. State some of the means by which you would expect to train pupils to use the inclusive unit in reading and singing music.

5. In your judgment, what place has silent reading (of notes especially) in the study of music?

6. Give an original illustration to show how you would lead children through the steps of Imitation, Recognition, Representation, Interpretation.

7. Suggest, if you can, games or near-games that could be used in the teaching of music. Do you think it would be possible to have pupils opera-tize a musical story, singing their parts, as in reading they dramatize a story by *saying* their parts?

8. Mention situations that may have come to your notice, such as possibly in Sunday Schools, where children are sometimes

allowed or encouraged to sing in other than light, thin, sweet, head tones. What should be done about it?

9. Judging from what you have learned of the forming of bonds, and of the nature of music, how would you attempt to cure a monotone? Why?

10. Do you suffer from hoarseness or sore throat after using your voice for an hour? If so, test whether you speak with open throat, and with your voice directed to the *m*-point in your foreface. How can one practice the three essentials of good voice as he goes about his daily life?

11. Tell or show how you would teach a rote song.

12. Make out a skeleton plan which might be followed in each day's teaching. For instance, you might start with a song, follow this with a review of scale exercises, etc.

13. Suggest as many correlations as you can of music with other branches.

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Appendix to Chapter XV

A Brief Statement of the Theory of Music

In the origin of music, voice came first, and may well stand first in the explanation of it.

Man's "voice box" is so made that he *could* sing continuously, like a siren whistle, from his lowest note to his highest and vice versa;[1] but he prefers to go up and down by steps, separate tones with jumps, skips, intervals, spaces, steps, between them. Further, he dislikes monotony, and so does not want all these steps to be equal, but puts in a half step here or there. Just where the half step shall be sung is a matter of taste and habit among different peoples. Arabian music, for example, has a scale different from ours, richer, and in some respects more accurate.

The musicians of the early Church, probably building on and changing the old Greek scale, finally placed a half step between the third and fourth notes of the scale, and another between its seventh and eighth tones. In particular, a Benedictine monk named Guido (best pronounced *Gwee-do*) who lived and sang about the year 1000, fixed upon a scale which is substantially the one we use now.

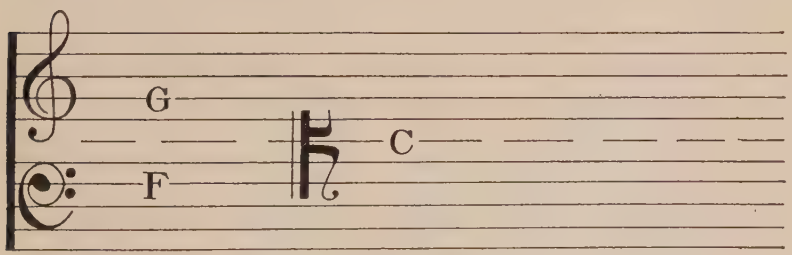
In order that bass voices may sing low and soprano voices high and still sing the same tune, it is convenient to have in vocal music note-names which *do not indicate a fixed pitch,* as notes do on the staff, but only *tone relations:* that is, they enable us to make the proper jumps, or steps, between notes, no matter what

[1] It is strange that musical instruments have not been invented to produce more of this sliding music. The slide on the violin and on the Hawaiian guitar suggest the fine possibilities that lie in this direction. Music should have its curves as well as its angles.

the pitch. These names are like pronouns: just as *I* or *me* may be any person in the world, so *do* may be any tone in the world. We may sing any tone we please, call it *do*, and go on with our scale from there. (In the school room, we must of course begin with pitch pipe or piano, so as not to get our scale too high or too low for the children's voices.) Guido felt the need for such note-names, and used for them the first syllable of each line of a Latin hymn to St. John, *Ut, Re, Mi, Fa, Sol, La,* — music as he wrote it requiring but six names. The Italians later changed *ut* to *do* (though the French have not) and added *ti*.

These names for vocal notes may also be likened to numbers: we could just as well sing "One, two, three, four, five, six, seven, eight," as to sing "Do, re, mi, fa, sol, la, ti, do," except that the Latin syllables are sweeter and less awkward. We should then have to remember that there is a half step between notes *three* and *four* (*mi* and *fa*), and between notes *seven* and *eight* (*ti* and *do*).

To write music, a "Great Staff" was used originally, consisting of eleven lines, as shown below, and the first seven letters of the alphabet were used instead of syllables. A clef is simply a sign to show where we are going to pitch our music on the big staff, high up, or in the middle, or low down. The treble clef, or G clef



(looking like a written capital S made backward, but really a modification of an old letter G, to show that the second line of the treble staff represents the pitch G) indicates that we are to use the upper part of the great staff. The bass clef (looking like a capital C, but originally a letter F used to show that the fourth line from the bottom represented that pitch) indicates that we are to use

the lower part of the great staff. The third clef, the C clef, is at present little used.

Now, the notes as written on the staff mark *fixed pitches*. If we begin our vocal scale on C, call that *do*, and mount the staff, all goes smoothly; for in music as written there is always a half step between F and G, and another between B and C (as shown by the absence of black keys at these points on the piano), corresponding to the half step between *mi* and *fa*, and that between *ti* and *do*. But if we start on any other pitch letter and call it *do*, we get into trouble: for the steps and half steps of the scale as fixed in letters on the staff do not correspond with those of our vocal scale, and the vocal scale has been so thoroughly drilled into us that we can not well change it. To unriddle this trouble, sharps and flats are used on the staff to "raise" and "lower" its notes wherever necessary until its intervals correspond with those of the vocal scale. For this reason, it is just as easy to sing a piece with a signature of three or four sharps or flats as if it had none; for given our *do*, our key note (always the first note of any scale as that scale is written on the staff), we go ahead and sing the same old vocal scale with the same old intervals.

(For further insight into the relations between the scale as sung and music as written, work the Class Exercise of this chapter.)

Enter now the instrumentalists, aided by the students of physics, with their measurement of each tone in terms of vibrations per second. They have proven what the vocalists vaguely felt, that upper *do* is "the same" note as lower *do*, except that the upper has just twice as many vibrations per second. Our modern musicians have established their "equally tempered" scale by starting from the *A* above "middle *C*" and agreeing that this tone shall be one of 435 vibrations per second. The *A* an octave higher, then, must have 870 vibrations per second. They now divide this interval between the two *A*'s, consisting of 435 vibrations, into 12 equal parts, *half steps*, and distribute the 11 intervening tones accordingly. Result: the so-called chromatic scale, running (to use our vocal-music names again) from low *do* to high *do*, and all the way by half steps.

In addition to the scale which has a half step between the third

and fourth notes, and between the seventh and eighth, and which is known as the Major Scale, there are two scales called Minor. They differ from the major scale in the matter of intervals, or jumps between notes. The relation of the scales is shown in the following diagram, where the circles stand for tones, those in the upper line being a half step apart.

Scales

Chromatic:	o	o	o	o	o	o	o	o	o	o	o	o	o
Major:	o		o		o	o		o		o		o	o
Harmonic Minor:	o		o	o		o		o	o			o	o
Melodic Minor:	o		o	o		o		o		o		o	o

CHAPTER XVI

Health Education

Many years ago, Disraeli, keenly alive to influences affecting national prosperity, stated: "Public health is the foundation on which reposes the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman." It may well be claimed that the care of individual and family health is the first and most patriotic duty of a citizen. — W. H. Taft.[1]

Exercise. — "In the suburb of Plainburg there were two families which we may call the Grumble family and the Humble family. The members of the Grumble family were a thin, whining, complaining aggregation, who looked as if their meals did not agree with them or do them much good. In contrast, the Humble family were well-nourished, happy, smiling, and contented. Both families ate in the same dining room at an apartment house. The Grumble family paid strict attention to business during meals, conversing only to complain about the food and seldom taking over fifteen minutes to a meal, while the Humble family always ate twice as long and made their meals occasions for laughing, joking, and having a good time. The members of the Grumble family said they had indigestion and wished to move because of the food.

"If you were the head of the Grumble family, what would you do?"[2]

The need for health education. — Health education is a continuation of life craft; for health is the condition of a body that is rife with lasting life. Health education combines "physiology and hygiene" with "physical culture";

[1] In the "Foreword" of *How to Live*.
[2] From *The Case System of Hygiene*, by Harry W. Haight.

for these two are united in purpose, and that is the deepest kind of union there can be.

The situation is this: Man, made in the image of his Maker, has become the most mongrel breed on earth, and badly distempered at that. Near 40 per cent of the young men of America have been found unfit for military service, and it is thought that the women, judged by female standards, are in a worse condition. About 75 per cent of our school children, some 16,000,000 of them, are said to be suffering from one or more physical defects. Roosevelt, it is said, speaking of the common ignorance and neglect of health measures among the people, expressed himself as emphatically as an ex-president is permitted to, exclaiming, "If the darned fools only knew!" Now, the school is supposed to put an end to this particular kind of fool, the kind that fools himself; but many schools are still training them. There is good evidence to show that school life is likely to interfere with growth, hinder nutrition, induce bad breathing by bad posture, adulterate the blood, cause mental depression, cumulatively fatigue its pupils and reduce their grade of health.

What responses, and to what situations? — *Action* is the response we want in health education, and to every situation.

Mr. Hasty Hypocrite pinned his prayers to his bedpost, pointed to them morning and night and said, "O Lord, these are my sentiments." When a child gets up in school and recites, "Eat slowly. Brush the teeth at least twice a day," and then throws his lunch down the trap door of his esophagus and leaves to his tongue the brushing of his teeth, that must please the Evil One as it does when Hasty Hypocrite goes out and cheats a widow. The text for both is, "This *do*, and thou shalt live."

Asleep, awake, by night, by day, we are practicing health or ill-health every minute. How can we see to it that our pupil does himself good, and not evil, all the days of his life?

What are the health responses? — A body has more cells than any country has citizens. To control it and keep it healthy is a more complex task than to govern a nation. We must beware or we shall be lost in the multiplicity of prescriptions as our legislative bodies sometimes lose themselves in a labyrinth of legislation. We need a table of simple health commandments.

Such a table has been prepared,[1] and is here presented.

The Sixteen Rules of Hygiene

I. Air

1. Ventilate every room you occupy.
2. Wear light, loose, and porous clothes.
3. Seek out-of-door occupations and recreations.
4. Sleep out of doors if you can.
5. Breathe deeply.

II. Food

6. Avoid overeating and overweight. (Or, for children, "Keep up your weight, but don't get too fat.")[2]
7. Eat sparingly of meats and eggs.
8. Eat some hard, some bulky, some raw foods.
9. Eat slowly.
10. Use sufficient water internally and externally.

[1] By Fisher and Fisk, with the aid of the Hygiene Reference Board of the Life Extension Institute. It is quoted here from *How to Live*, Ch. V.

[2] Among children, there is frequently a serious problem of undernourishment. In view of this fact, Dr. Eugene Lyman Fisk, Medical Director of the Life Extension Institute, has suggested (in personal correspondence with me) that Rule 6 be more accurately adapted to children by the change indicated.

III. Poisons
11. Eliminate thoroughly, regularly, and frequently.
12. Stand, sit, and walk erect.
13. Do not allow poisons and infections to enter the body.
14. Keep the teeth, gums, and tongue clean.

IV. Activity
15. Work, play, rest, and sleep in moderation.
16. Keep serene and whole-hearted.

The essentials, then, are simple: Air, Food, Poisons, Activity — as we deal with these our lives are made or unmade. But the rules are comprehensive: each of the sixteen, if expanded, would form a whole chapter or treatise.

The above are individual responses. Self-preservation first. But no one lives to himself alone — gets ill, or well, or dies alone. After the child has learned to inspect himself, or be inspected, and care for himself for his own sake, he must help to inspect the community, or see that it is inspected, and care for the public health for the sake of the general good. Some of the bonds we want to form are community bonds.

What reactions already? — There are many wrong reactions. As in good English, so in good health: the reason why it takes so long to educate our pupils is because we must spend so much time untraining them. It is too bad that the command, "Children, obey your parents" cannot be made to read, "Children, imitate your parents." The plain fact is that in health education we hardly know whether to begin with the parents or with the children.

The average specimen of human young is a pitiful waif, cast up on the shores of the twentieth century by a receding

form of civilization. Time was when he could participate with his parents in many types of happy activity, such as the work of the farm. But these occupations are gone, and the hours hang empty, or may be filled with evil. Surveys show that about half the children observed outside of school are loafing, ignorant even of play.

Many children sleep without a window open, and not one child in three sleeps sufficient hours under right

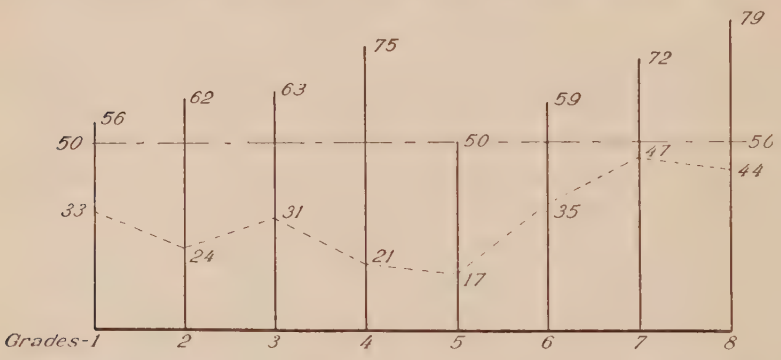


Fig. 29.[1] Showing the per cent of underweight children in each elementary grade of a school system that is probably typical. The straight line shows the per cent (50) of underweights to be expected. The broken line indicates what per cent of each grade are 7 per cent, or more, underweight, and so require special attention.

conditions. A considerable per cent eat too much of the wrong foods and too little of the right ones, and so are undernourished. (See Figure 29.) Often they do not work and play "in moderation."

Civilization, cultivated, is a fine flower; neglected, it is a woeful weed.

[1] From the *Educational Survey of Honesdale, Pennsylvania*, by Daniel Wolford La Rue and Charles J. Naegle. Published by Honesdale School District.

Nevertheless, the case is a cheerful one. Children have a wealth of instincts which, under right guidance, drive directly for health. For instance, the greatest problem of childhood is that of proper feeding; and if there is any one thing children love to do, it is to eat. We shall take up the native responses under "Readiness."

From ready-formed bonds to new connections. — The very existence of so many cranks shows us that the health bonds, like those of nature study, must be rather numerous and largely independent — the air-eating crank, the chew-it-to-a-fluid crank, the water-soaked crank, the muscle-minded crank, and many another. Health depends on a number of habit-factors, and almost any habit may be formed first. Grading, in the usual sense of the word, is scarcely necessary. Of course we shall pass from sensori-motor to high-level bonds, with practice first and principles afterward. But we shall feel free to teach "whatever comes along" that is easiest and most interesting for our pupils to learn, or, sometimes, whatever they perforce *must* learn if they are to keep their grip on life. At the same time, we may be sure that the bonds formed will function very frequently, aiding in all after acquisitions. Health is like wealth: the more you get, up to a large limit, the easier it is for you to get more.

How induce readiness? — How to induce readiness is one of our largest questions, for many children do not love health for itself alone. A teacher, on returning to a town where she had taught some years before, inquired of a parent about his son. "He is dead," was the reply, "and the reason is that we were never able to teach him to take care of himself. Athletics and exposure brought him to an early grave." Such cases are all too numerous. Consequently, we must

often follow the indirect method, the method of health-by-stealth.

Influence of environment. — Ingersoll proposed to improve the world by making health catching, instead of disease. It *is* catching: in any town where the grown-ups have caught it, the children are almost sure to. It must be noised abroad that the secret of success has been discovered, something which successful people always carry with them, and without which no one can hope for permanent success. Play days and field days rouse interest, several towns, perhaps, uniting in the sports. The Parent-Teacher Association and other organizations will help take the "ease" out of disease, and when the conscience of the community is prepared, perhaps a sanitary survey can be put through — for the school system, at least.[1]

Further, we can, without offense, ask some very searching questions at school, perhaps making a health survey of the children.[2] Terman thinks the teacher should make a sleep survey each year, and says she will find something to surprise her.[3] The Junior Red Cross or the Modern Health Crusade[4] will carry the work home. And when Daddy and Sonny are doing the same health stunts in comradeship, the force is irresistible.

If any disease wave dashes through our community, let us use it to float our health instruction — not to stir fear, but

[1] For details of a "teacher sanitary survey," see Strayer and Engelhardt's *The Classroom Teacher*, p. 264.

[2] Ernest B. Hoag and Lewis M. Terman — *Health Work in the Schools.* Houghton Mifflin Company.

[3] See his *Hygiene of the School Child*, p. 378, where questions for such a survey are given.

[4] For particulars as to how to conduct such a crusade, address the National Association for the Study and Prevention of Tuberculosis, 370 Seventh Avenue, New York City.

to explain causes, to make pupils careful for themselves and others, and to create confidence that hygiene means high health.

Condition of learner. — Perhaps health is the one thing we learn best when we are sick. It is then we feel most keenly our hygienic blunder (or accident) and resolve that it shall not occur again. A similar feeling attaches to the discovery that one is undersize or underweight [1] (though inheritance should always be considered in this connection), or that he is "below par" in anything. It is said that all boys want to be athletic and all girls beautiful. We must build on such wants. A nutritional class, with special milk feeding in school, is often a real wonder worker.

The teacher. — The time is at hand when none but the healthy teacher will be permitted to teach. But that is not enough: she must regard her little charges as so many young things to be brooded into healthy maturity — and brood them, practicing with them, so far as possible, the essential habits with regard to air, food, poisons, and activity. Perhaps the conscientious teacher offends most frequently through overwork and its effects. She does not "work, play, rest and sleep in moderation," and so fails to "keep serene and whole-hearted," loses the power to enjoy her work and her pupils. The only way to cure some teachers of overwork is to amputate the conscience — the enlarged and work-infected part of it.

Task and stimulus. — If we could pass health around on a platter, everybody would take a large piece. But of noth-

[1] Age-height-weight standards for boys and for girls may be obtained from the Government Printing Office, Washington, D.C., for five cents each or may be found on pp. 279–280 of *Keeping the Body in Health*, by M. V. O'Shea and J. H. Kellogg.

ing else, probably, is Goethe's statement so true, that you must "earn your inheritance in order to possess it." What instincts and abilities will set our pupils to work to do this?

The instinct for action appears in games and exercises, and many of these involve ryhthm and voice, as singing. Music of any kind is always a strong reënforcement. There should also be action in the form of pupil participation in ventilating, lighting, and perhaps heating the schoolroom, and if possible in preparing the school lunch.

Curiosity can be aroused and satisfied by experiments. What happens to the candle or the plant that has no air? What will a smoking piece of blotting paper show as to just how the air is flowing through the room? Heat oleomargarine and butter to see which melts first. See if you can blow easily through various pieces of cloth. If not, they are unfit for clothing.

Play is the health educator's mighty magazine of energy. If we glance at the time commonly given to recess and physical training (see table in the Introduction to Part II of this book), we find it near the upper limit. If we add to this the time the child spends, or may spend, playing during the noon hour, before and after school, and during vacations, we shall find it amounts to more than all his time in school. As science is just common sense organized, so play is just animality organized and directed. Play that more definitely expresses ideas is found in dramatization: let one bandage another's arm, or tie up a finger supposed to be cut — do not wash it, as water is bad in the ordinary wound — or show (if the children are strong enough) how the fireman carries a man on his back.

Imitation, self-assertion and competition, wholesome fear, the herd instinct — all of these forces we shall tap to drive

home our sixteen points. Other branches of study, since they are helped on by health, should return the favor. In construction work, cut out and mount pictures of model postures; in drawing, make health posters; [1] in composition, compose health stories; let the spirit of health flow through all branches.

Exercise. — If we want to "guide the nerve current repeatedly along the right path," book work must be secondary, for we are not building many book bonds. Actual practice must lead, seconded by experiments and demonstrations. If there is any subject in which the teacher should be ashamed to fail of approach to the tandem method of teaching, it is health education. Her daily life should be a living embodiment of the "sixteen rules," and she should have some results to show in her own health — it is of no use to employ bald-headed drug clerks to sell hair restorer.

Our whole school practice can be a tandem project. In the morning, we will "ventilate every room we occupy." Later, when we are ready to take our exercises, we will ventilate the room still more. If the weather permits, monitors may throw the windows open. We peel off our coats or sweaters so as to wear, for a time at least, "light, loose, porous clothing." If at all possible, we "seek out-of-door occupations and recreations" by going outside for our exercise. We stand and walk erect, and we breathe deeply.

It is out of school that the "errors and exceptions" will worry us. To head them off, and to lead the pupils to practice as they will perform, we must keep asking them,

[1] Helpful and suggestive material may be obtained from the American Posture League, 1 Madison Avenue, New York City, from the National Child Welfare Association, 70 Fifth Avenue, New York City, and from other sources.

"Now can we not do all these things at home in just this way?" At the same time, we must avoid shocking or offending these homes too seriously, for that interferes with our usefulness and actual service. A morning inspection will help us to find out what is going on, or a survey may be

FIG. 30. A health poster illustrating an old fable with a new meaning. (From p. 3 of *Diet for the School Child*, issued by the Government Printing Office, Washington, D. C.)

conducted by the children themselves. Sometimes a health club is formed, and the officers conduct the inspection according to a "Score Card for Hygienic Living." [1]

Organizing for health education. — Arrangement of program is one of the first considerations. Schools that have

[1] Such a score card may be found in O'Shea and Kellogg's *Keeping the Body in Health*, p. 288, and in Strayer and Engelhardt's *The Classroom Teacher*, p. 268. For the method of conducting a health club, see *Teaching Health*, a bulletin issued by the Bureau of Education, Washington, D. C.

plenty of health education and handwork can safely lengthen the school day as compared with those that do book work only. Recesses, if taken ideally, would be short, and timed at intervals of about an hour; such recesses, however, under ordinary conditions, would probably have a serious interrupting influence. But whenever the recess, the teacher should enjoy it with her pupils, teaching and leading whenever necessary, and seeing to it that pupil play leaders are brought into service as they are needed and are able to serve.

Playgrounds are often so limited that the play can only be a small sample of what it ought to be. In such cases, it may be well to take recess by sections that occupy the grounds on some plan of alternation. Some prefer to keep boys and girls apart in their play. It is more important to separate the younger children from the older. Apparatus is desirable but not indispensable. Where manual training is given, home made apparatus, such as see-saws, swings, and slides, can be constructed. But the essential thing is that the pupil's larger muscles shall come into play until he breathes energetically and his circulation quickens, without throwing him into a sweat.

Plays and games. — Formal exercises, carefully graded and usually taken by count or command, are very fatiguing and are now used but sparingly. The great reliance of health educators is rightly placed on plays, games, sports. The teacher who can lead children in play may almost be called well equipped.

Johnson, in his excellent little book,[1] distinguishes five stages of play-and-game development. The first is three

[1] George Ellsworth Johnson — *Education by Plays and Games.* Ginn and Company. The book gives many games for children of all ages.

years in length, and is characterized by playing with the body and whatever objects may be about. Typical games are "This Little Pig Went to Market," and "Pat-a-Cake."

The second period (ages 4–6) is individualistic rather than social. It calls for many toys, and enjoys personal freedom and activity. The child does not take up many formal games except under the leadership of adults. But he can be induced to play chasing games, such as "Tag" and "Drop the Handkerchief."

The third period (ages 7–9) is still individualistic, but skill and competition are marked. Very welcome are such games as "Puss in the Corner," hoop races, and simple ball games.

Period four (ages 10–12) is one of great bodily activity, "self-assertion and apparent selfishness," and keen interest in running. The beginnings of organization appear. Good sample activities are relay races, "Cross Tag," "Follow the Leader," and ball games.

In the fifth period (ages 13–15), sex differences in games stand out, and there is a strong tendency toward organization into teams and gangs. Ball games of all kinds are enjoyed, with swimming and the usual athletic events.

Of course these periods are not sharply separated by birthdays; but a knowledge of general trend of development will help greatly in guiding our games.

Set exercises. — Exercises need not be "set" at all. If you keep in mind the essential feature, which is to work the large muscles of trunk and limbs, the exercises you devise for your children will sometimes be better than the intricate and carefully graded ones found in the books. Two commands are usually given for each unit-movement, a preparatory command, given rather slowly and with voice

gliding upward, followed some two seconds later by the command of execution, given in a slightly higher tone and so sharply as to be almost explosive. Thus, "Hands on hips" —— "Place!" Pupils must not move before the second command comes.

Such exercises are likely to be uninteresting and fatiguing. Take them out of doors if possible. Within doors, substitute, frequently, some such exercise as marching or swinging through seats. But a real out-of-door frolic is best of all.

Effect. — One reason why the teaching of health has not been more successful is because health has been taken for granted, and illness as a special visitation of Providence. We have not taken the trouble to stand up and be measured as to health. Many a man has been chagrined to find himself turned down by a military examining board as unfit to fight. The pupil must know whether he is "turned down" or not.

There are many ways of accomplishing this. One is the morning (or periodical) inspection, with scoring, already spoken of. Another is the reporting of weight to parents, month by month, along with grades in arithmetic and reading. (Parents can be brought to take as much pride in a fine child as in a good dog, or the family car.) Weighing contests at school picnics have been made use of. A posture test may be given (heels, hips, and shoulders should form a straight line, with head erect, when the pupil stands) and the results scored, and one may "take off" for notably bad sitting or standing posture during school hours. Many teachers get from the Bureau of Education (Washington, D. C.) a "Classroom Weight Record," hang it in the schoolroom, and let children make the entries on it as they "play the game," trying to win a gold star for normal increase in

weight. It is found that, in order to win, they become willing to eat wholesome foods which they have once despised. Tagging the children when they are weighed interests both them and their parents.[1]

We *can* teach health if we think enough of it, and keep other things from crowding it out; and children will pursue it if they find that others, whom they respect, are also in the chase, and that the results are real. A child will even brush his teeth with soap (a good dentifrice, if it is pure) if he finds that it wins him release from the dentist's chair with the verdict, "No cavities this time."

Tests. — If we teach physiology and hygiene from a book, have the pupil recite to us, and then give him a written examination, his situations and responses are not directly those of health practice at all. Not that book study is worthless: the hygiene I learned in this bookish way in a country school years ago has kept coming back to me ever since in a way most helpful. But such medicine needs to be rubbed in with deeds.

What we want to know is whether the pupil is practicing his sixteen rules, and others related to them. The tests and surveys and score cards already suggested will throw a part of the information before us. The attendance record will reveal more. How many days have the pupils (and the teacher) missed because of illness? Tests such as those for good air can be applied. Is it *pure*, *moving*, *moist*, and *cool?* The thermometer tells us the last, and perhaps we can procure instruments for finding out the other points. Then there are the tests made by the school physician, of eyes

[1] Tags with spaces for normal and actual weight, etc., may be obtained from the American Child Health Association, 370 Seventh Avenue, New York City. This organization also furnishes morale-making literature for children.

and ears and various other organs, all of which help to show the working of health bonds or the lack of them.

Signs of illness. — Practical tests or symptoms that show lack of health should also be in the teacher's ken, that she may know when to summon the physician, isolate the pupil, or perhaps exclude him from school. Such symptoms are great paleness, unusual dullness or sleepiness, sickness at stomach, frequent requests to go out, chills, high temperature, discharge from eyes, nose, or ears, eruption of any unusual nature, sore or inflamed throat, cough if at all severe or peculiar, enlarged glands, headaches, "fits," very bad breath (especially if with other symptoms), dizziness, or failure to eat as usual.

Signs of fatigue. — The teacher should also practice the recognition of those pupils whose tissues are being consumed by too much work of brain or muscle; in other words, those who are fatigued. Extremes of condition appear: the figure is either slouchy, with a constant tendency to seek support of some kind, or it is overtense; the gait drags or shows spasmodic quickness; the face is pale or carries a nervous flush, but is not healthily rosy; there may be much yawning and sleepiness, or insomnia; ideas refuse to come at all or come with such a rush as to confuse utterance; the fatigued person may be precipitate, fiery, and rude in dealing with others, or become too tired to meet them with comfort. Which of these opposite symptoms appear depends largely on the stage of fatigue. Fatigue poison, like alcohol, usually starts an increased liveliness, followed by depression.

The eyelids often droop, the lines of the face turn downward, and the smile is forced or absent. Temperature may be high, and headache or tightening in the head is common, sometimes accompanied by palpitation of the heart, indiges-

tion, and dizziness. Attention wanders from the lesson to the pupil's own condition. He may work feverishly, with many errors, or slow down altogether.

The remedy is rest — and the fifteen other points.

CLASS EXERCISE

Using this chapter and related readings as a basis, make out a hygienic daily program, from rising to retiring, for a typical student. On page 288 of O'Shea and Kellogg's *Keeping the Body in Health*, or on page 268 of Strayer and Engelhardt's *The Classroom Teacher*, will be found a score card for hygienic living. This should give great help. Those who believe that health practice really makes for health should modify the program to fit their individual needs. keep it conspicuously in their rooms, and follow it.

FOR FURTHER STUDY

1. In my boyhood study of physiology, I learned the name and location of each bone in the body. Do you advise this practice? What is its relation to health?

2. Suggest how you would have your pupils, at the proper age, begin to inspect the community and do something about improving unsatisfactory conditions.

3. What, as you see it, is the relation between mental and bodily health?

4. What do you think of the "case method of studying hygiene," as illustrated in the exercise at the opening of this chapter? Give an illustration to show how you could use it in presenting to your class some other point of healthy living.

5. What do you think the community should do in the way of keeping its teachers healthy — for example, seeing to it that sanitary residence and good board are obtained at fair prices?

6. Special assignment: Let some one look up "The Cause and Cure of Colds," and report at the next hour. A statement should

be included as to what the teacher's duties are in relation to colds, especially among her pupils.

7. What is the best way to present temperance physiology? Why?

8. Outline what you would regard as complete health service for a school system, as sanitary inspection, medical inspection, etc.

9. Tell how you would manage the windows of a room if you had to depend on them for ventilation.

10. How would you decide whether or not a game is good for pupils of a given age to play? Is football a good game for grammar school boys? Why or why not?

11. Investigation shows that country children are, in general, less healthy than city children. What can be done to improve rural health?

12. The chief reasons for rejection from the army are defective eyes, teeth, heart, and feet, underweight, and hernia. Is there any lesson in this for teachers?

13. Should health education include education in matters of sex? If so, how can it be managed?

14. In many towns, "Well Baby Clinics" have been established, to which mothers can go with their babies for information and advice. Show how the school is interested in this.

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CHAPTER XVII

Garden-and-Farm Craft

Exercises. — 1. Do you think there is any culture in agriculture? What was the original meaning of culture? (See dictionary.) About one half the people of the United States live in the country, and there are more people engaged in agriculture than in any other one industry. What importance does this give to farming? If all farmers should strike, or refuse to sell their product except for a very high price, what would be the effect? What future use is the country child likely to have for the farming bonds that we build into his education? The city child? Should agriculture be taught in city schools? Why or why not?

2. Imagine yourself in a section of country far removed from your own, where grow crops that are strange to you. For example, if you live in the North, imagine yourself in the cotton belt. What are the chief questions you would ask, and the principal things you would want to learn to do in order to raise a crop there?[1]

A good place to begin an education is right where Adam and Eve learned their lessons together, in a garden. Now a farm is just a garden grown big, and farming is a serious and extensive kind of life craft. Agriculture is man's way of drawing his living out of the ground — and out of the air. He must learn to do it without spoiling either the soil or himself. (There seems to be no danger of spoiling the air very soon.) Even city children should learn something

[1] For an interesting account of what the city boy needs to know when he goes on a farm and how to teach it to him, see Aretas W. Nolan's *The Teaching of Agriculture*, Ch. V.

about farming — enough to appreciate farmers and give them a square deal on election day and all other days.

Situation and response. — The situation is a piece of ground (or means of getting it), and the response is doing whatever is necessary to make that ground bring forth as many fold as possible. "Agriculture," however, is now a broad term, including animal husbandry as well as the care of plants. To help us get our bearings, let us glance over its divisions.

Agronomy is a general study of soils and crops. *Animal Husbandry* deals with different breeds of cattle, hogs, sheep, poultry and other farm animals, and how to care for them. *Horticulture* is literally gardening, and treats mainly of vegetable gardening, landscape gardening, orcharding ("pomology"), and the propagation of plants. *Farm Management* takes up such topics as labor, equipment, records, and markets. In addition, courses are sometimes given in *Farm Physics*, or *Engineering*, *Improvement of Plants and Animals*, *Rural Life*, etc. In some sections, *Forestry* is studied as a part of agriculture.

What bonds shall we form? — In the elementary school, we can attempt only a limited program of farm-and-garden craft. It will form so natural a continuation of the work in nature study and other elementary science that the children will not know, as they come up through the grades, where one leaves off and the other begins. We may take topics from any or all of the branches of agriculture; but we shall choose always from among those that loom large in the community, which our pupils can be interested in, and which they can master.

Let us take a very representative topic as a sample: What bonds shall we build for gardening? Our little farmer must

(1) select his plot so that his plants will have light, heat, air, water, food; (2) select and test his seed; (3) prepare and plant his seed bed; (4) cultivate his crop, and protect it against weeds, insects, and diseases; (5) gather seed early, perhaps, and later harvest the crop. If he is gardening for profit, he will also need to study marketing.

Proceeding by this simple method of time order, it will be equally easy to list the bonds necessary to put through any other project.

As we give our pupil a graphic vocabulary in drawing and a musical vocabulary in singing, so we want to give him an agricultural vocabulary of farm bonds, the units of farm activity. By this means we shall hope to leave him so that he will go on growing whether he goes on schooling or not, so that he can profit by the farm bureau, farmers' conventions, farmers' bulletins and farm literature. If he casts in his lot with the farm, we want also to leave him with high agricultural morale, so that he will see the farm as the foundation of civilization, and himself as an important social servant, holder of a great human trust. As such, he will not only try to improve his own homestead, but join with his neighbors to create an improved community life.

Many related responses. — It is hardly a new subject we have to teach, but old ones continued in a way that adds variety and charm. We have taught our pupil to seek out-of-door occupations and recreations, and have taken him on nature study trips. He has identified fruits, flowers, leaves, vegetables, has cut out their pictures, drawn and colored them. He has observed where plants grow best, and perhaps what happens if they lack light, heat, food, or cultivation. He has learned that toads and most birds

are friends, and that weeds and many insects are mischief makers. He may even have had an eggshell garden right in the schoolroom.[1]

From old bonds to new. — It is not difficult to introduce but one difficulty at a time, for the connections we want to form are related largely in the form of similar series. Raising a house plant is farming on a small scale, for it requires a very similar series of reactions.

From our eggshell farm, the flowering of bulbs, and plants in window boxes, we may pass to the school garden; from school garden to home garden; from gardening (especially if in the country) to the farm club with its projects in poultry, swine, fruit canning, or anything else that is related to the farms of the community; and from these to the more systematic and extensive study of agriculture with book and field work.

Having fixed first a number of sensori-motor bonds that are easiest and most interesting to learn, that occur very frequently, and which prepare best for what is to follow, we can map out a two- or three-year course in agriculture for our upper grades.[2] One very sensible plan is that of devoting one year of the course to plants (simple studies from agronomy and horticulture) and the other to animals. In schools where there is pressure for time, these courses are given in alternate years. Where pupils are mature, interest high, and the work in nature study well under way, a three-year course may be attempted, the third year being given to farm

[1] The younger children like this. Each brings an eggshell, and has his name written on it. A hole is punched in the bottom to let out excess water, the shell is filled with soil, and the child then plants some such seeds as lettuce, radish, cabbage, wheat or buckwheat. The shells are best kept in a pan of soil or moist sawdust. See Trafton's *The Teaching of Science*, p. 130.

[2] For suggestive courses, see Nolan's *The Teaching of Agriculture*, pp. 204 ff.

management, roads, the "country beautiful," and other life-bearing topics.

Perhaps the very peak and top of the course would consist in trying out new seeds and plants, in attempting to produce improvements and new varieties in plants and animals. Children have time for this which their busy parents may not have, they are old enough to feel its fascination, and they are capable of producing results of mighty value. A neighbor of ours, by planting the seeds of potato "balls," brought into existence a new variety of potato that proved popular in the region for many years.

Readiness. — Man developed through a hunting and fishing stage, and there seems to be a hunting and fishing instinct. Man also developed an agricultural stage; and whoever will watch his feelings from the time when he first sees verdure and smells fresh dirt in the spring till the crops are fetched in in the fall, will probably agree that there is something approaching an agricultural instinct.

The start is easy. That work of art, the modern seed catalog, is enough to inspire enthusiasm. Most girls and the younger boys prefer the flower garden, the older boys the vegetable garden. The presence of seeds is a challenge to plant.[1] The presence of weeds, however, is not always a sufficient challenge to pull them. Enthusiasm may die as the sun gets high. For this reason, it is well to put in crops that will mature before school is out, or else arrange for summer supervision.[2] Prizes may be offered (perhaps

[1] Seeds are furnished by the Children's Flower Mission, Cleveland, Ohio, at a penny a packet, transportation paid. The teacher may secure blanks from the Mission.

[2] Where there are several teachers, one is sometimes employed to remain during the summer and look after the gardens. If there is a teacher of agriculture in the school system, this duty usually falls to him.

donated by interested people), a contest inaugurated, a club formed, the farm bureau agent and other speakers or demonstrators invited in, literature provided, reports presented of what others have done, sample products shown, school credit given for certified out-of-school work, exhibits prepared for the county fair, visions raised as to financial and other returns.

Where the work is new, you may have to win your community first; for farmers often object to having farming taught. "I can teach my boy that at home," is the gruff judgment. "I want the teacher to show him what I can't," — and that may mean just what is necessary to get the boy off the farm and ready to "make his living with his head"; for many discontented farmers still feel that this is highly desirable.

Our object, of course, is not to keep all boys on the farm, but to get and keep all there who naturally love the life and so belong there, whether from country or city. As with every other vocation, it is a matter of taste and talent on the part of the individual, and of need and reward on the part of society. The farmer has not been getting the reward he deserves. We must all do everything in our power to see that he does get it.

That the love for country life may grow, we must sing farm songs, look at country pictures, magnify country joys, and read country literature.

An old lane, an old gate,
  An old house by a tree,
A wild wood, a wild brook,
  They will not let me be.
In boyhood I knew them,
  And still they call to me.

So many of us do not seem to idealize the country till we have left it, nor our companions till death has called them, nor our occupations till we are deprived of them. We must learn to idealize the everyday real.[1]

Exercise. — Garden-and-farm craft, handled by the tandem or near tandem method, is not difficult either to teach or to learn. The trouble is to find teachers who have themselves mastered it, and then to give them time and materials enough to pass on their learning.

In addition to the school practice, the chief aids to learning are the textbook and other literature, demonstrations and experiments, field trips, home work, and club projects. Helpful literature can be procured in quantity, and covering almost every subject, from the Bureau of Education, the Department of Agriculture, and the Federal Board for Vocational Education, all of Washington, D.C.; and also from your state college or university at which agriculture is taught. Demonstrations are not so much to give proof (for the children do not usually doubt our word) as to make the truth so impressive that it will be remembered and used.[2] Let us not give these merely because they are pretty lessons that teachers are supposed to present in order to appear professional, but let us do that which aims straight for the best of all demonstrations, a good crop.

Home work and club projects are pretty much of a piece. If you have not handled them — or even if you have — write to your farm club leader, at the state college

[1] The Division of Farm Life Studies, United States Department of Agriculture, has made a study of country planning and country art, and can furnish information on the subject. Landscaping is promoted by the Bureau of Plant Industry, of the same Department.

[2] Many suitable demonstrations are found in an excellent little textbook, *First Principles of Agriculture*, by Goff and Mayne.

or the state capital (state department of education), and you should receive precise information as to just how to proceed.

The beautiful thing about this subject is that, granted a chance to supervise, we can have the pupil practice exactly as he will perform. The farm has been called the "greatest laboratory in the world." But it is more than a laboratory, for it takes us away from the pettiness of man to the largeness of nature.

Effect. — That which rouses readiness ends with effect. Our visions are fulfilled or they are not. To end the season with a garden grown to grass may mean a much better one next year, or it may mean none at all. But he who has eaten the fruit of his own labors, even though it cost him the sweat of his brow, has had a taste of something that goes much deeper than his tongue; and he who sells his product bulges his heart at least as much as he does his pocketbook.

We must see to it that our little gardener succeeds. We must also help to see to it that the big gardener succeeds, that farm success shall mean as much as business success, or academic success, or legal success, and lead as directly into legislative halls and other centers of influence.

Tests. — Agriculture is full of tests, for soil, for seed, for eggs, for the products of the field, for animals, and what not. All of these, together with the fact that the whole undertaking lies right out before us in objective concreteness, make the measuring of the results of teaching comparatively easy.

"But academic standing is not the true measure of success, either in the teaching or in the study of agriculture. That measure is found in the performance of those who

actually go to the land, live there, and succeed; for after all, the fundamental purpose of our great system of agricultural education is to insure a better agriculture and to make a country life as nearly perfect as possible." [1]

CLASS EXERCISE

1. Make a rough agricultural survey of the region in which you are. From the Bureau of the Census, Department of Commerce, Washington, D.C., may be obtained "Statistics" for your state, abstracted from the returns of the last census. This contains tables of farms and farm property, "value of all crops and principal classes thereof," etc., for the state and its counties. (If you are in a city, select some rural county for study.) If time and purpose permit, a more detailed survey can be made. For a form that will help in this, see Nolan's *The Teaching of Agriculture*, p. 167. It may add to the interest to visit farms.

Which are the major crops in your county? The minor?

2. Make a list of the agricultural topics that should be taught in the elementary schools of the county. How should they be arranged so as to suit the season of the year? About how much time would you give to each?

3. Discuss at pleasure the equipment and methods most desirable for teaching these topics.

FOR FURTHER STUDY

1. Suggest some correlations between gardening and agriculture on the one hand and other school subjects on the other.

2. Why is there no time allotment for this subject in the table given at the beginning of Part II of this book? (The data there shown was collected from cities.)

[1] Eugene Davenport, in the "Introduction" to Nolan's *The Teaching of Agriculture.*

3. Tell how a school museum could be made to help in the teaching of agriculture.[1]

4. How would you try to get the support of the homes for your school work in agriculture?

5. Which would you prefer to be, a second Luther Burbank or a second Napoleon Bonaparte? Why?

6. What advantages are gained by following the order of the seasons in giving a course in agriculture?

7. Estimate the influence of the telephone and the automobile in improving country life. What can we expect from the wireless telephone?

8. Point out some differences between garden-and-farm craft as found in the elementary school and agriculture as found in high school and college.

9. On what phases of the subject should there be most emphasis for girls?

10. In an agricultural state, what provision should be made at the normal schools for training teachers of agriculture?

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[1] Samples of wheat products may be obtained, practically free, from the Pillsbury Flour Company, Minneapolis, Minnesota, and samples of corn products from the American Manufacturers' Association of Products from Corn, 1236 First National Bank Building, Chicago, Illinois.

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CHAPTER XVIII

Practical Homemaking and Shop Work

Exercise. — Consider a rather complex home plant, consisting not only of the house and its outfittings, but of barn and garage, with fences, garden tools, etc., and with a shop so outfitted that lively boys can there work out their numerous mechanical projects.

1. Make a list (illustrative if not complete) of the things that girls below the high school age can do in such a plant to help with the food, clothing, and housekeeping.

2. Make a list of the things the boys will need to do if they help to keep the home plant in repair and also work out such projects as the building of wireless apparatus.

3. What, if anything, should the girls and boys learn in connection with these things besides the doing of them?

Here we are with two new and nebulous subjects on our hands, and all the mists of the morning about us. Homemaking and shop work have been passing from society over into the school for a long enough time to have found their fixed and definite place, yet we are not even agreed as to what to call them; and as school branches, like Indian children, are commonly named according to the nature they show as they mature, it appears that we are not yet clear as to what we are trying to teach. It must be a large part of our quest in this chapter to find out what our quest is, to box the educational compass and find out whither away.

Situations and responses. — This subject, like that of nature study, has many large situations and many varied responses. Substitute for our limitless natural surround-

ings a limitless human environment of men and women engaged in a multitude of household and industrial arts, and

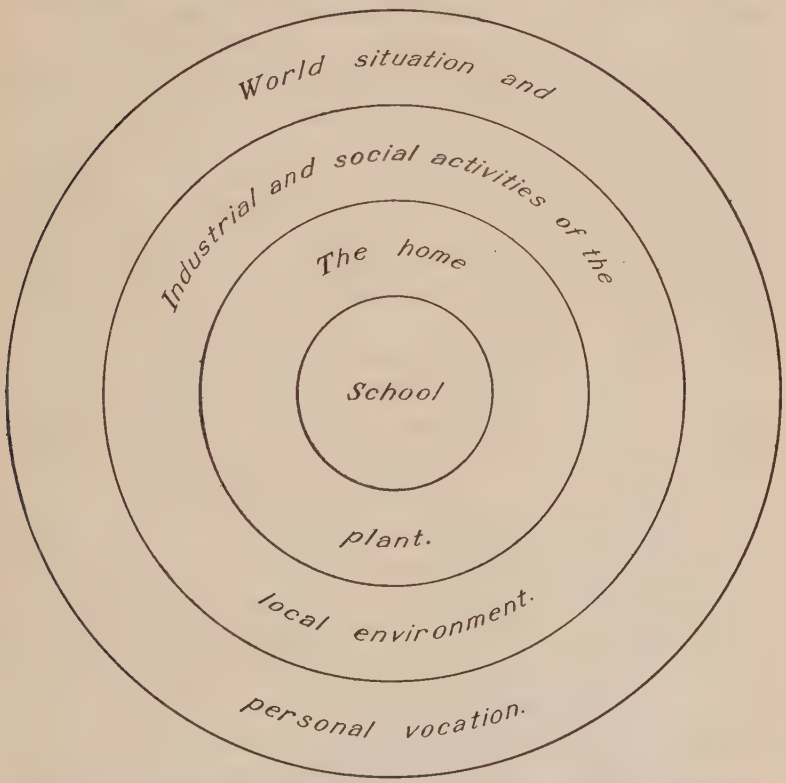

FIG. 31. Suggesting the passage from home and shop work to a world-wide situation.

we see at once there is more that *might* be taught than any learner can possibly learn.

The general situation may be pictured as in Figure 31. Let us devote a topic to each circle of activity that environs the school.

Activities of the home plant: homemaking. — There is great need for simple courses of study and textbooks that begin the study of homemaking with a common-sense discussion of where a dwelling house should be located, how it should be built, of what materials, with what rooms, and for what purposes. Not all, of course, are privileged to choose a location and plan their own building; but most of us have the opportunity, some time or other, to say where we will or will not buy or rent, and what kind of dwelling we will consent to abide in as home. Health education (sanitation) and beauty craft must here be linked up with homemaking.

Home furnishing might next be considered. We cannot expect harmony or beauty if we bring together, inharmoniously, wall paper, rugs, and pieces of furniture picked up here and there, any more than we can pass as well dressed if we combine a frock coat with golfing trousers.

After the home is furnished, we must give a great deal of attention to food, clothing, and housekeeping, that great body of educational material which has so often shrunk, in the average school, to "Cooking and Sewing." Cooking should be rather "Studying and Preparing Food." Even in the elementary school, we can teach a few of the more important things about food production, sanitation (as of milk), food values, marketing, housewifery (cleaning, use of refrigerator, canning, utilizing left-overs, etc.), and cooking. Marketing, in particular, has been neglected, and the childish bride with her ignorant buyings has been the prey of business greed and the target for newspaper fun all too long. She must know how to provide "balanced rations," how to turn such tricks as the substituting of beans and peanut butter for luxury-priced meat, how to gratify

the feminine love for bargains (if haply it exists as reported) by finding (or making) a real bargain every day.

Clothing can be studied under captions similar to those for food, following processes and products all the way from the cotton field, or the sheep's back, or the cocoon of the silk larva to the thrusting of the worn-out garment into the rag bag — and beyond. Under this plan we would take up the topic of clothing production, with a study of sample textiles made from cotton, silk, and wool; sanitation, perhaps with special reference to sweat shops; clothing values, both from the standpoint of health and beauty and of durability and economy; marketing, for we have great need of a balanced wardrobe as well as balanced rations. What should a wardrobe contain, and where and when can we buy it (or make it) so as to get a penny's worth for every penny? Housewifery and husbandry, the care of clothing, how to clean, press, darn, patch, and make over — there is evidence on every hand that these are needed, and there is no reason why a seventh grade pupil cannot do all the elementary things that are necessary to keep clothing in good condition. Sewing should include something of millinery and of dress designing and pattern study; for a girl can often make a hat or gown that will beat those made by the milliners; and training in these matters is needed for purposes of appreciation and the forming of the buyer's judgment.

Hand sewing, outside of school, is giving way to the work of the machine; for why should we sew with fingers alone when we can just as well do it with the aid of the feet, or with an electric motor? Much hand sewing, like weaving, has a killing monotony about it; and if it is at all fine, it requires muscular coördination more accurate and difficult

than is needed to run a machine. Coarse hand sewing forms a good introduction to needle craft, but as compared with machine sewing the hand process should receive, in the elementary school, little attention. Yet quite a fraction of the schools that teach sewing have failed even to mention the machine. In others, machine work is carried on successfully in grades five and those following.[1]

Home budgets and buying, judgments and ideals. — A stream of earnings and income flows into a home, and a stream of expenditures flows out. How high the family welfare can rise is determined largely by the relative sizes of these two streams. The budget bond is certainly one that we want to form. To begin with, every upper grade pupil should have his own little income and expense account; yet strangely enough there is not one of our common branches in which such an important matter is likely even to be touched upon. "Get as you can and spend as you please" seems almost to be the American motto. Certainly, many children grow up by it. But it is a poor motto for a home. Probably Cupid would not find his business slowing down even if our young people should acquire a fairly clear idea as to what constitutes a marriageable income, and of what fraction of it is usually laid out for rent, fuel, food, clothing, and the other departments of the family budget.

"Consumer's judgment" is a phrase that ought to grow in circulation and in power. Such judgment, if it is to develop, must have exercise, and have it in relation to an *ideal:* What would be most desirable; and what, if we consider income, and have regard for all other expenses, can we take

[1] For an excellent discussion of *Home Economics in American Schools,* see the monograph with that title, by Mabel Barbara Trilling and others, published by The University of Chicago.

and pay for? We can both develop these ideals and judgments at school, and encourage parents to practice their children in them at home. It has been estimated, by good authority, that the average wife is the expender, for food, clothing, etc., of three fourths or more of the family income — and most girls become wives.

Activities of the home plant: shop work. — Every good home should have at least a few tools, and somebody to use them. How many and how varied shall be the tools and the processes in the home shop depends on the home. Some find it to their advantage to do nearly all their own repairing, even on the family automobile. Some build, not only chicken coops and dog houses, but additions to the home.

How much the school shall teach of all this must depend on what the neighborhood needs, and on the equipment and talent available. Schools that have extended the work to a very wide range have put in woodworking ("manual training"), painting, shoe repairing, sheet metal work, plumbing, printing, forging, machine shop work, electrical work, work in clay, cement and concrete, and foundry work, with its molding and casting. While the average school must be satisfied with much less, yet there come opportunities everywhere; such as that for painting a door, or soldering a leak, or putting in a window pane, which are highly illuminating to pupils even when practice in the process is impossible.

Materials can be studied by the plan suggested for foods and clothing, tracing them from the point of production to that of final use. Everyone should know such things as the qualities of a few of the more common kinds of wood, pine, hemlock, oak; the difference between hard coal and soft coal; and the properties of the different forms of iron, cast iron, malleable cast, and steel.

Industrial and social activities of the local environment. — It is said that the boy who has made a coat hanger is likely to hang up his coat at home; that the one who has made a seed tester is likely to take a new interest in agriculture; that making a fly swatter leads to the swatting of flies, making a tree protector to the care of trees, and erecting a bird house to a new feeling for birds. By such means do we pass from school to home, and from home to community.

The visiting and studying of shops and industries is frequently set down as so much geography. Little matter, perhaps, what we call it; but the boy's tinkering in wood should lead him to the carpenter shop and the sawing and planing mill — perhaps to the lumber woods. The girls should see "the latest" in the house outfitting and furnishing stores, and study its use. All, if they can, should visit the canning factory, find out why canned goods are so cheap, see what their advantages and dangers are, and how the commercially canned product compares with what we "do up" domestically. These are only suggestions; your teaching environment will give you many more.

World situation and personal vocation. — Getting the pupil into touch with home industries and having him try his hand at their typical operations so far as possible, helps him in two ways: it develops his industrial vocabulary, action bonds and word bonds, in terms of which he will understand the world's work; and it indicates to some degree whether he has any yearning ability to undertake some particular part of that work as his own life job.

The junior high school, that great finishing school for so many working men, is responding to this need by putting in more extensive courses in shop work, courses so chosen

as to include many of the typical operations performed by the industrial worker. The object is not to turn out laborers who are skilled and finished in any one line, but to give such prevocational samples as will help the young worker to understand the world's industrial work and himself in relation to it. All this is reënforced by courses in economic and vocational civics, until by and by the embryonic citizen has glimpsed, in groups at least, the 10,000 different occupations of this country, and perhaps feels a warming of the heart toward some of them.

What related responses are ready? — Plenty of related responses are ready — so many that in most cases there will be no difficulty whatever. This is especially true where the children have come up through several grades of construction work. It is only a step from whittling out dice or laying out a game board to the planning of a larger project in wood. Drawing has mapped the way to so much of mechanical drawing as is necessary, and arithmetic by this time has furnished the figures. Nature study, elementary science, life craft, and geography have all brought forward the problems of eating, clothing, and dwelling, have familiarized the pupil somewhat with foods and materials, and have pointed the guide figner of learning out toward the world-wide view of humanity, its homemaking and its industrial doings.

Relation of the desired bonds. — On the whole, we may say that the desired words are related rather loosely. True, we can find connections in series such that *a* must come before *b*, as the making of a joint must precede the construction of a piece of furniture. Some trunk lines appear; such as measuring in cooking (or in anything else), the effect of materials on each other, and of heat on all. In the more complex work are inclusive units to be mastered, as when

the homemaker must think in terms of a meal at a stroke; but the unity is seldom an inviolable and rigidly mechanical adjustment of elements. It is adaptable, and can be suited to circumstances.

Which bonds first? — We shall begin, of course, with sensori-motor connections, and build out from them, asking how primitive men and early settlers must have carried on their homemaking and industrial work, how it is done now in various parts of the world, and perhaps how future man seems likely to improve on all this. But there is no good reason for beginning with the primitive form of any kind of work unless it furnishes bonds which are easy and interesting to learn, which occur frequently, and which prepare best for what is to follow. Probably there never was a farm boy who felt as much interest in pulling up grain or grass, or in using a sickle, as he did in his father's mower or reaper; or as much interest in scratching the ground with a stick or a shell as he did in a sulky plow, or even a walking plow. What girl ever cared to spend her time cooking soup by dropping hot stones into it? Such a process certainly will not occur often in future learning, nor does it give any superior preparation for what is to come. The child-as-primitive-man idea has been entirely overworked. Both the child and the primitive make for crude, simple responses to their environment; but that is no reason why they should be the *same* responses unless the principles of learning so dictate.

So far as practical projects are concerned, no course of study has won common assent; but each school system does that which seems good in its own eyes. Sewing, cooking, and manual training are introduced in almost any grade from the fourth up, and the exercises appear in

almost any order. In sewing, for example, dresses, kimonos, nightgowns, buttonholes, crocheting, darning, aprons, ironholders, patching, etc., are introduced anywhere from the first to the fourth year of work. Sometimes the making of the same article is repeated for three years.

The study of clothing has commonly preceded that of cooking, but for no good reason that anyone can discover. Simple cooking is the easier to learn, and the "effect" is better, as successful cooking brings an appealing result almost immediately. Foods simple in composition and easy to prepare should come first, and are best studied when they are in season, or perhaps when the pupil's interest runs high for some other reason. In the study of clothing, it is desirable that experience with textiles shall precede the study of patterns and dress designing, just as in shop work it is to be hoped that we can interest children to some extent in materials before they attempt to decide, in any large way, how these materials shall be used, worked, and joined.

The practical plan on which our schools will settle is probably that of passing from the construction work and life craft of the early grades to the forming of easy, interesting, and almost miscellaneous bonds in homemaking and shop work (or "manual training") in grades five and six, often of such a nature as to illustrate other branches. In grade seven will begin a two year study, or in junior high schools a three year study of these subjects, as serious and systematic as the development of the pupils will permit.

Readiness. — In psychology, we sometimes speak of a *constructive instinct.* Apparently there is such an instinct; but unfortunately for us teachers, it does not always lead pupils to construct that which we suggest and when we

suggest it. The result is that for years teachers of these subjects have been organizing their work more and more about the children's interests as a center. Schools that have attempted to make woodwork pay by having the boys make drawing models, nature study apparatus, and so on, have found themselves drifting — or progressing — in the direction of kites, windmills, bows and arrows, and ball bats. This solves the problem by removing the problem — a great triumph for education. Luckily, these branches are so broad and so flexibly organized that they permit us to follow the interests of the pupils without wrecking the subjects.

If in addition to this superlative demand for a suitable task we check up the other conditions of readiness, with which we are now so familiar, especially seeing to it that the teacher can do with confidence and skill what is required of the pupil, we shall probably find our children as often overready as not ready enough.

Exercise. — Readiness expresses itself in the desire to "make something." Sometimes the pupil becomes enamored of some object, such as an airship, that is beyond his powers of construction. In such a case, we can show him how to make his beloved ship in a very simplified form; or lead off in it ourselves and let him assist; or get his attention on something else, perhaps showing him that a boomerang is a kind of detached propeller and getting him to try that; or if the worst must happen, let him try his ship and get disgusted with his failure.

But in general the teacher proposes and the child chooses. Perhaps she will propose a bird house, a bookrack, a kite, a swing, a coat hanger, a flowerpot stand, a milking stool, a sleeve board, a water wheel, a windmill, a window box.

If books of exercises are at hand, these are sometimes handed out and the pupils encouraged to select whatever they think they would like to try. Quite often, some play interest is uppermost, and toys or play apparatus such as a seesaw will be made, perhaps for the school playground; or there is a home interest to be satisfied, and something is selected to surprise and please the home folks. But the school is a social home, and children are often almost romantically altruistic in their desire to serve it. They will repair its breaks, oil its floors, gild its radiators, make window boxes and bookcases for it, and prepare its lunches, or sandwiches to serve or sell at social affairs, with right good will.

Combining project and drill. — The logically ideal way to teach these subjects, and the method which the early teachers of them tried to establish, is to select the simplest bonds, such as the making of easy stitches in sewing and of easy operations in woodwork, drill these in thoroughly, and proceed to the next step, a trifle more difficult, until at length the hardest and most complex operations have been mastered. Then, but in general not till then, would the pupil be permitted to make the things that thrilled him with enthusiasm.

We now realize that the enthusiasm must come first, and is even more important than extremely careful grading. This is what is meant by saying that a plan of teaching must be *psychological*, appealing to the pupil, even if it is not strictly *logical*. You can see that it is the old problem of the music teacher right over. Shall the pupil sing and play scales, or tunes? The answer is, Both. Combine the two by providing tunelike exercises, each of which presents but one new difficulty, and master that difficulty as a part

of the tune. In the same way, in our homemaking and shop work, we are "doing things" all the time; but the teacher uses her ingenuity to steer the pupil into things which hold but one new difficulty, be it a new stitch, or the use of an oil stove, or the holding of a plane. The pupil is then made to see that if he wants to put through his project, he must do a little drilling. "If you want to make a window shelf, you must first learn to saw off a board, and saw to the line." "If you want to make buttonholes, you must first practice the buttonhole stitch until you can do it well." Accordingly, we first spend a little time drilling in the new process, delightful in itself, perhaps, but at any rate carried through by zeal for what is to follow.

The tandem method and the prevention of errors. — Many a boy has learned a great deal about the sawing movement by taking one handle of a big crosscut saw with his father managing the other. It would be a piece of pedagogical good fortune if we could have tandem tools of many sorts. But the teaching of "the practical arts," as they are sometimes called, is comparatively easy so far as the actual operations are concerned, for guidance can always be external or imitative. If the boy pushes his plane straight against the wood instead of giving it a draw cut, or if the girl pushes her sewing machine treadle with a jerk, the teacher can give a demonstration, and if necessary guide the process.

Since in all these branches there should be as much work as possible done at home, care must be taken to see that the pupil does not lose, by careless practice alone, what he gains from the teacher's tuition. But "the proof of the pudding is in the eating"; in most cases, the product itself is a pretty good proof of the process.

Practice and final performance. — The ideal place for a homemaking department is in a dwelling house, with all the rooms and equipment of a home. The centralized rural school may be able to use its teacherage and its shop equipment to good advantage. But tools and processes do not change much as one transfers them from place to place. Even the one-room rural school can afford a few dollars' worth of shop tools and cooking utensils, make its own work bench, and cook its own lunches, perhaps prepared in part from its own school garden. Sometimes a neighboring home will open its door — at least its oven door. Sewing machine companies or dealers sometimes furnish, at little or no cost, for the sake of the advertising, one or more machines to help start the work.

As the school garden leads to the home garden, so should school domestic art become thoroughly domesticated by making its way into the home. Shop work should pass to the home shop. If there is none, let us encourage the boy to develop his own little kit of tools. It is fortunate if the major part of the practice work can at all times be carried on in the home, or in a club outside of school, reserving the limited school hours for the gaining of information, solving problems, and developing an appreciation of homemaking and industrial work the world over.

Finally, the teacher ought not to feel, as teachers sometimes do, that the work is a failure if it is not of a kind that is popular at the time. If a girl can be taught to toast bread or a boy to mend his shoes, there is the true spirit of the real economic worker. Where time is short, perhaps only one year of work can be given at a time; and there is no reason why boys should not learn cooking — camp cooking at least — and enough sewing to fasten buttons where

they belong, or why girls should not do a little shop work. For what is a kitchen but a cook shop?

Effect. — Work of this kind is not merely lodged in the pupil's brain and hand as so much skill, but can be placed on exhibition and carried home and elsewhere to attract attention and speak for itself. The eating of the well-prepared dish, the wearing of the garment, the use of the shop product in play or work — these make this kind of learning, like virtue, its own reward. Our main concern is to see that a proper project is undertaken, and that it is carried to successful conclusion.

Testing essential bonds. — Our examinations in home-making and shopwork can be eminently practical, consisting of a sample piece, a typical product, with as much on paper as is necessary to bring out information, thought, and appreciation.

Samples saved from the work of various classes can be formed into a rough scale that is nevertheless very helpful, and for the nicer measurement of the material product standardized scales are appearing.[1] The citizen efficiency that flows from these branches, sympathy for the laboring man, justice to the capitalist of the large-minded kind, an appreciation of our homemakers and of laws necessary for their protection and support — these will always be most valuable and most difficult to measure.

[1] The measurement of hand sewing, in particular, has been made the object of an extensive investigation, reported in Dr. Katharine Murdoch's *The Measurement of Certain Elements of Hand Sewing*, published by Columbia University. See also Chapters VII and VIII of *Home Economics in American Schools* (University of Chicago), and the pictured scale for measuring machine sewing, found in its latter pages.

CLASS EXERCISES

1. Let groups or individuals visit the various departments of homemaking and of shop work in elementary, junior high, or high schools that may be within reach, and report on them as to courses, equipment, aims, etc. Discussion should follow as to what suggestions from this report can be adopted by teachers of elementary grades, especially grades seven and eight.

2. Assume that the class has been asked to serve as a committee, and make recommendations to a school board as to what industrial work it shall put into a junior high school. The object is to include such materials and processes as are common to a number of important industries, so as to give as much industrial insight as possible and also form such brain-hand bonds as will enable pupils most quickly to become proficient in any of the more common industrial occupations.

Perhaps it will be well to proceed by making a list of materials and one of processes, deciding then what work will at once include most that is typical and also make the strongest appeal to the pupils.

FOR FURTHER STUDY

1. Do you think it would be advisable to include in homemaking at least a little work in nursing? Why or why not? If so, how can it be managed?

2. Should we have industrial readers, as we have geographical readers? What good or harm might they do?

3. Show how the practical arts discussed in this chapter can be correlated with the other elementary branches.

4. Which is more important to give to children, training for skill in the processes of home and shop, but nothing more, or a large and thoughtful appreciation of the place of home building and industry in the world's work, but without the skill? Why?

5. What is the object of a Consumers' League? What should you think of organizing a school into a consumers' league, for a time at least, and studying consumer's facts?

6. Comment on your own education in homemaking or handicraft. How, if at all, do you wish it had been different?

7. Should the elementary school teach any fancy sewing? The high school? Why or why not?

8. Tell, in a general way, how you think the work of the high school, in the practical arts, should differ from that of the elementary or junior high school.

9. How is it that most industries (away from the home plant) have become specialized while so much unnecessary housework is still done in many homes? Do you think cooking will ever be done in a public cookery and the meals sent in to the family as laundering is now done in a public laundry and the clothes sent in? Could not large dwelling establishments, perhaps covering a city block or two, provide for a plan of this sort, leaving the housewife free for other duties?

10. The typical girl marries and becomes the mistress of a home. Is that a sufficient reason for teaching homemaking to all girls? Give reasons.

11. Should married women be employed on the same basis as single ones? What has this to do with the teaching of homemaking? And what has motherhood to do with both?

12. In the text, the junior high school is spoken of as "a finishing school for working men," and a little later the statement is made that its object is "not to turn out laborers who are skilled and finished." How reconcile these statements? If a boy while in the junior high school finds his vocation, what training ought he to have beyond that?

13. Let someone look up and report on school lunches, especially the value of a warm lunch, and means of providing it. What is the value of the thermos bottle or box in this connection?

14. Do you make out a personal budget for each year? Keep an expense account? Why or why not?

15. If you have access to a library of textbooks, see whether you can find one that would be suitable for teaching either home-

making or shop work in the elementary school. If you find such a book, describe its main features. If not, describe such a book as you would like to have.

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CHAPTER XIX

Arithmetic

Exercises. — 1. The practical use of the slide rule or of a table of logarithms in computation is rather simple; but the derivation, the theory, the full mathematical explanation of either of them is quite complex. If you were to study either, should you prefer to begin by testing out a few multiplications, roots, etc., to convince yourself that it does work, and then use it, leaving the full understanding of its intricacies to develop with more mature mathematical growth; or first understand its rationale, reason out its principles and commit its rules, following this with practice in solving problems? Why?

Which method would work better with a class, especially a class that is somewhat immature, some of whose members find even simple mathematics difficult?

2. A boy who played a great deal of baseball, and who was just picking up the use of the slide rule, spent several hours computing with it the percentage standings of different teams as game after game was played. How do you think he would have responded to a demand to reckon on the intricacies of interplanetary distances or of foreign exchange, in neither of which he felt any interest?

List a few kinds of mathematical problems that you care to solve. What should guide us in selecting problems for pupils? What makes a problem interesting for them to work at? Is there anything which can make a problem important, no matter whether it is interesting or not?

Arithmetic and intelligence. — Among the members of a certain tribe in West Africa, to say to anyone, "You don't know nine times nine" is equivalent to saying, in an

insulting way, "You are a dunce." In a Siamese law court, if a witness cannot count or reckon with figures up to ten, he is not allowed to testify.

Among us, too, arithmetic has been regarded in many quarters as a kind of test of intelligence, and the study of it was thought to be one of the surest means of developing mental power. There is some basis for this belief. But "intelligence" and "mental power" are rather vague terms. There are different kinds of intelligence, which we may clasify according to the subject matter they deal with, as intelligence in mechanics, in art, in social affairs, etc. In other words, there are different sets of fibers, in various portions of the brain, which respond, each to its different kind of subject matter, with varying degrees of success. We are not surprised if we find the mathematician rather "slow" when it comes to managing political parties, or even dinner parties.

Accordingly, one of the first things to find out about arithmetic is whether it develops a kind of intelligence that is used a great deal in the everyday life of the people; and one of the best ways to get light on this matter is to inquire what problems the average person is solving from day to day as he goes about his business.

Situation and response: the social use of arithmetic. — Investigation has yielded quite an extensive answer to this question. Wilson [1] found that 83 per cent of all daily-life problems involved money. The great bulk of these were concerned with buying and selling. Outside of buying and

[1] Guy Mitchell Wilson — *A Survey of the Social and Business Usage of Arithmetic.* Teachers College Contributions to Education, No. 100. Based on material collected, from both city and country in the middle West — 14,583 problems from 4068 persons in 155 different occupations.

selling, the most important money problems were those dealing with (1) labor and wages, (2) interest, (3) rent, and (4) insurance. The arithmetical processes that appeared most frequently were multiplication (which alone included 31.85 per cent of all the processes), addition (20.12 per cent), subtraction (12.93 per cent), division (11.12 per cent), fractions (9.01 per cent), and accounts (5.53 per cent). These six included a little over 90 per cent of all the processes. The process that stood next in importance was percentage, but this appeared in less than 2 per cent of the problems, and no other process involved as many as 1 per cent of them.

In addition, there were usually not more than three or four numbers to be added; and in both the addition and subtraction problems most of the numbers consisted of but two or three figures. Most multipliers were of but one place, and none reached five places. In division, most of the divisors were of two places, and but one reached five places. Fractions appeared frequently, but there was seldom a problem that contained more than a single fraction, and that was usually small. The fraction $\frac{1}{2}$ made up almost $66\frac{2}{3}$ per cent of all. Ten simple fractions constituted more than 95 per cent of the total. These, stated in the order of their frequency, were $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{8}$, $\frac{2}{5}$, $\frac{4}{5}$, $\frac{1}{8}$, $\frac{1}{5}$.

Yet we must not conclude in a hurry that children should be taught only the wee bits of arithmetic. On the principle of "six-foot training for a five-foot jump," the principle by which we insist that teachers of arithmetic should have studied algebra, the principle by which we know that our future occasional and unpracticed performance in every direction will surely fall short of our present highly cultured best, we must teach beyond the margin of the niggardly need of the day. And this is especially true of a

subject like arithmetic, in which growth is likely to stop with schooldays; in which, after teacher and pupil have parted, there is no newspaper to keep up a kind of correspondence course in it, as there is, for example, in history and geography.

Then there is the matter of mathematical-social reform. We may or may not want the metric system, or the octaval system,[1] or some other system; but if we ever do decide on something superior, we shall need to create sentiment for it by teaching it — to the brighter pupils, at least — just as we create sentiment against alcoholic drinks by teaching our children about them.

Stimuli and reactions. — In general, the stimulus is any problem of moderate difficulty, and the response consists in performing the right operation with numbers and getting the answer.

To perform this right operation in mathematical problems that appear in daily life, the following bonds seem to be required:

1. Bonds for counting, and for the number symbols, both words and figures, including enough of the Roman notation for the reading of the clock face and the chapter numbers of books.

2. Bonds for adding, subtracting, multiplying, and dividing (*a*) whole numbers of three or four places, (*b*) simple common fractions with denominators with at least two places, (*c*) decimals to two or three places, and (*d*) the more common denominate numbers involving at least two kinds of unit, as feet and inches.

[1] For an account of *Octic Arithmetic*, address E. M. Tingley, Raymond Terrace, Elizabeth, New Jersey. Theoretically, it appears to have advantages over the metric system.

3. Bonds for the simpler cases of that special form of (common and decimal) fractions known as percentage.

4. Bonds for the application of the above to suitable problems: that is, bonds for "thinking," "analysis," "reasoning."

Bonds to avoid. — Although simple statements of the bare necessities in arithmetic, such as the preceding, have for years been placed before the teaching public, many who have been fed or surfeited with a more inclusive diet will still think the above too meagre. Accordingly, let us list a number of the bonds with which the modern teacher of the subject deliberately refuses to waste time or retard the development of her pupils. Such are the connections involved in certain operations, such as those in square root and cube root, most of ratio and proportion, greatest common divisor and lowest common multiple — except as they can be determined by inspection — complex and compound fractions, and difficult reductions of denominate numbers. Commonly omitted also are tables, measures, and problems which are either obsolete or of narrowly limited use, as in troy weight, apothecaries' weight, partial payments, partnership, exchange, annual and compound interest, longitude and time, and those selections from solid geometry which have gone under the name of mensuration. Further, all through every topic that is taught, the teacher must take pains to avoid forming bonds for the rare and unimportant, as in the use of long and confusing problems, or problems based on situations untrue to real life and uninteresting to children, words unfamiliar to the pupil and unnecessary to the subject, numerical expressions seldom used (as fractions with such denominators as 11, 13, and 17), or finicky distinctions that contribute nothing toward the getting of

results, like the refined discrimination (for young children) between a number and a figure, or the discrimination by anybody, young or old, between concrete and abstract numbers before permitting himself to perform operations with them.[1]

What related responses can children make? — In the lower animal mind there seems to be almost no idea of number. Country people, even Yankees, used to believe that a hen can count three, and so they left three nest eggs in the nest. But the hen's number requirements appear to be satisfied by one egg, and a china one at that — or even by no egg if other conditions are favorable. Some of these lower animals sense the outside world much as we do; but number does not exist in the outside world. Matter, quantity, is there; but number is no more attached to it, before the mind of man comes into contact with it, than a child's name is born with him. It is the mind of man that names the child, and that numbers the parts of the material universe.

Accordingly, we can easily understand why the inborn power to use and understand numbers is not an instinct, but an ability. Arithmetical operations are not a sensori-motor activity which we enjoy, to any considerable extent, in common with the brute creation, but a high-level performance so different from anything they know that whither

[1] See E. L. Thorndike's *The Psychology of Arithmetic*, Chapter IV. Herein is quoted a problem from E. C. McDougle, which states that the number of ladies and gentlemen in the class equals the number of cabbage heads in a certain garden, and asks "how many cabbage heads in the garden." The blackboard solution, as given by normal school students, always takes this form:

29 ladies
15 gentlemen
44 cabbage heads

we go they cannot come. The absence of arithmetical ability in a young child ought not to surprise us so much as its presence does. And the safer error to perpetrate, always, is to introduce arithmetic, and the various topics of it, needlessly late rather than needlessly early. No child can thoroughly understand our number system any more than he can our railway system. Teaching him to use numbers is much like teaching him to start and stop a trolley car; he may soon learn the trick, but he will not know why it works. Nor need he know, for his purposes; it is number craft he wants.

What a bright child, when he comes to school, can do with number, depends largely, of course, on his pre-school environment. Most children hear the number names applied frequently to collections of things and to houses, streets, and so on; hear and perhaps repeat number rhymes, such as

> One, two,
> Buckle my shoe;

"count," at least in the sense of repeating in order the first few number names as in games; are interested in their age, the ages of others, birth dates, dates of holidays, and the like; see watches and clocks and have some idea of time; notice distances or spaces, and one or two space-measuring units, such as the yardstick; come into contact with pounds, quarts, and so on; handle and know the value of the minor coins; and may even approach the meaning of a few fractions.

At what must have been a pre-school age, I counted the fingers on my father's hand and on my own and received a shock of surprise which I have never forgotten when I found that his big hand had no more fingers on it than my

little one. Also, my mother used to "quarter" a great many apples and give me some of the quarters. I was again surprised to find that such a quarter was included among the fourths, or quarters, which the teacher and the arithmetic book tried to explain to me.

According to the Binet tests, about three-fourths of the six-year-old children can count thirteen pennies, and know by name the penny, nickel, quarter, and dime. At a still earlier age, they can tell which is the longer of two lines whose lengths are $1\frac{7}{8}$ inches and $2\frac{3}{8}$ inches and which is the heavier of two weights of 3 grams and 15 grams, can pick out from a number of geometrical forms one that is like a sample shown them, copy a square, put together two right triangles of the same size and shape so as to form an oblong, and give their age.

One difficulty at a time. — The system of paths which we must form in a pupil's brain and which represents his knowledge of arithmetic when we have finished with him, is probably knit together with greater regularity and thoroughness, with more cross connections from each point to other points, than is the case in any other of the common branches. This is at once both dangerous and glorious for the teaching of the subject. Dangerous because the unskilled teacher will have her pupil rambling here and there through the maze, meeting a dozen difficulties at once, getting nowhere and ending in confusion, like a stranger lost in a subway system; glorious because the teacher who has clear prevision of the subject as a whole can soon make her pupil acquainted with trunk lines and express methods, and can grade the whole course with such gentle progression as to make its mastery a delight.

Let us lay down two general cautions: (1) Use no un-

necessary terms, either literary or arithmetical, and see that those which are used are thoroughly understood. "Arithmetic is the science of numbers and the art of computation" — such was the statement, in black-faced type, that met my eyes when I opened my first book in arithmetic. If you ask children, in a room where there are chairs, to tell you what a chair is, they will probably say, "That is one." We must give them that kind of definition: "$\frac{1}{2}$ is a fraction, $\frac{3}{4}$ is a fraction, $\frac{1}{5}$ is a fraction," etc. So simple a term as "equals" may be harder for a child to master than would be, for us, such expressions as "feed-back circuit," or "commutator," or "grid leak." Also, we must shun problems the language or situations of which are strange. A pupil who is asked to figure on rutabagas or the harvesting of alfalfa may be nonplussed, not because he doesn't know the arithmetic, but because the botany and agriculture are too much for him. Much more bungling and halting than we have suspected have come from the fact that pupils do not get the meaning of the problems placed before them. And here is another reason for not introducing arithmetic, at least book arithmetic, until the difficulties of primary reading are well out of the way.

(2) In introducing any new topic, choose such numbers and processes as will be very easy, familiar, and clear, leaving the one new point outstanding as the only one demanding attention. If we are teaching the telling of time, and the Arabic figures are more familiar to our class than the Roman letters, let us use an Arabic-figured clock face. We can further simplify matters by putting only the hour hand on the clock at first, practicing with this, and later adding the minute hand. In teaching new processes, from addition right on up, we will begin with

such small and simple numbers that our pupils' attention can be fixed wholly on the new operation; yet in teaching division of fractions we shall hardly choose $\frac{1}{2}$ as one of the first divisors, for when inverted it will probably look and feel, to some of our pupils, more like a whole number than a fraction. In many other cases — in fact in all cases — it is wise to think out our illustrative numbers and procedures quite carefully in advance.

Relation of the desired bonds. — We may almost say that there is no such thing as an isolated fact in arithmetic. Every number bond stands related to every other, and related in many ways. All we can do is to form those bonds that are most important for practical use.

Bonds in series are found in the fundamental process of counting, with which the race began its arithmetic, and with which children are happy to begin. When we count by 2's, 3's, 5's, 10's, or *n*'s we simply take every 2d, 3d, 5th, 10th, or *n*th member of the original counting series and form them into a new series. All our tables, our fractions, our decimals — everything in arithmetic — can be placed in serial order. But it does not follow that all must be learned in serial order; probably the individual numbers should be, just as we count them off;[1] and probably all tables should not be.

The great trunk line bond in our number system is that for handling numbers by *tens*. The successive groups of ten are like the successive octaves in music: each number and each note repeats the corresponding one in the range

[1] We could, of course, begin by teaching a child *five* before we teach him *one*, and some have suggested such a procedure. We could explain that *five* means "as many as you have fingers on your hand," have him bring us five objects, show him how to write the figure and the word *five*, and so on.

below it, but with something added. This not only makes it easy for the pupil to count by tens, but helps him also in addition and subtraction. The teacher should point out and arrange a series of problems to emphasize the fact that adding 8 and 6 (for example) is much like adding 18 and 6, 28 and 6, 38 and 6, and so on. A similar process should be used with subtraction.

Another trunk line bond, one that runs through all mathematics and which should be used in arithmetic as early and as widely as possible, is that of the equation. If we explain that the sign " = " means the same as "is," "are," "makes," or other similar word, even first grade children can be trained into its use, and no matter how old they get in mathematics they will never depart from it. To translate a problem from literary language into the language of the equation is the first and fundamental step in solving it; and the * or the ? or the x that we have to leave on one side or the other of our equation shows us better than words the nature of the answer and how it is related to the other, the given numbers.

Other trunk line bonds that should be kept before the pupil's attention as he takes up topic after topic are those of the fundamental processes, addition, subtraction, multiplication, and division. Strange as it may seem to the mature mathematician, many children, as they progress through the course, fail to see that they are constantly performing these old operations, first on whole numbers, then on fractions, decimals, and denominate numbers; and many a pupil spends months on algebra before he discovers that he is doing over again with letters what he did in arithmetic with figures.

All our generalizations and practical rules of procedure

(when stated in lively, familiar English) should also be fixed as trunk line bonds. "Always turn the divisor upside down and multiply," and "Any number times zero is zero," are examples. We have our slogans, war cries, mottoes and "yells" in mathematics as elsewhere. The good teacher distinguishes herself by discovering which are the trunk line bonds and then inventing a "catchy" phrase to make them stick.

Inclusive units are found in the very nature of number. It is the fundamental feature of our decimal system, or tens system (decimal is from *decem*, ten), that it groups units into bunches of ten, bunches of ten into a larger collection of 10 × 10, etc. Practice favors the forming of inclusive units in all operations: adding leads us to see 7 and 3 as 10, and to hold in mind what we must carry as we pass to the next line of figures; subtracting and multiplying and dividing all require that we keep a partial result in mind as we go on manipulating our figures; and so on. We must analyze our own quick performances rather minutely to discover these difficulties, and put the pupil through each process, at first, slowly and deliberately.

From sensori-motor to high level. — It is said that all learning should start from life — that is, the concrete — and come back to life with its applications. All our arithmetic should start with sensori-motor bonds, pass into a high-level, abstract performance, and return to the concrete, the sensori-motor, for verification and application. It is the sensori-motor bonds that put the "under" in understanding.

However, it must not be thought that the intermediate, abstract stage of progress is dead, or disagreeable to children. They prefer working with abstract numbers rather than concrete; but this may be due in part to the very concrete non-

sense they are often required to go through in the way of labeling and ticketing each number, in solving a problem, as so many days, dollars, pounds, mules, or pineapples.

The materials we use for our concrete work ought to be, if possible, such as children would naturally care to count, add, subtract, and so on. One great supply of such material is commonly neglected, namely, the children themselves. They can come out on the floor and count, add, subtract, multiply, and divide their own groups — in short, dramatize each process as they approach it. But we should not confine ourselves to any one kind of material; just as we must make it clear that a number is not a name for any one object, but that "three," like a pronoun, is passed around from one to another in a group as we count in different orders, so we must make it clear that neither number as a whole nor any particular operation is always to be associated with any one kind of concrete material, but that we can number steps, inches, claps of the hand, cupfuls, and minutes as well as persons, pennies, crayons and pencils.

If denominate numbers had always been called concrete numbers, perhaps we should have made a more concrete use of them as an introduction to our abstract tables. Thorndike rightly calls our attention to the advantages of practicing with quarts and pints when learning the table of 2's; on yards and feet with the 3's; on gallons and quarts with the 4's; nickels and cents with the 5's; weeks and days with the 7's; pecks and quarts with the 8's; and square yards and square feet with the 9's.[1]

Steps toward the abstract. — In the very beginnings of number work, it may be advisable to pass by rather gently graded steps from material object to immaterial number.

[1] E. L. Thorndike — *The Psychology of Arithmetic*, p. 142.

Beginning with "sure enough" pennies and putting two and three together to make five, we may then pass to pictures of pennies, drawing on the board two circles and three circles followed by a group of five circles, later use merely a mark to represent a penny, after that the written words, and finally the figures. The children should be made to realize that these are all different ways of saying the same thing.

The final passage to the abstract may be made somewhat as follows: "How many are three apples and two apples?" "Three boys and two boys?" "Three hours and two hours?" "Three anythings and two anythings?" "Three and two?" The abstract answer will usually be forthcoming.

But it is easy to use objects so long that their use becomes a positive hindrance and a great waste of time. The teacher can discover, by watching the class carefully, when it is safe to give them up. Nor need we always resort to objects in order to make a process concrete in the sense of feeling real, reliable, and familiar to the pupils. *We can build on the highest bonds that are well fixed.* For example, we can base multiplication on addition, putting down three 4's and adding them to show the meaning of 3×4. In a similar way, the more abstract operations of algebra are made real by reference to the more familiar processes of arithmetic. But of course we can always resort to objects when they are needed — and that will often be at the end of a process, to verify it, as well as at the beginning to introduce it.

Sensori-motor beginnings in advanced topics. — We must not think of the concrete in arithmetic as confined to the use of peanuts, marbles, and toothpicks when a child begins to count, add, and subtract. On the contrary, let us recall that a sensori-motor beginning is one of the trunk line bonds in all teaching. In studying trade discount, we can

have our school store with its "so much off for cash." If we study stocks or insurance, we can form a little stock or insurance company. The pupil's own deposits in the school bank may serve as a start for banking and interest. And to help with taxes, we can assess the desks along the aisle as if they were so many houses along the street.

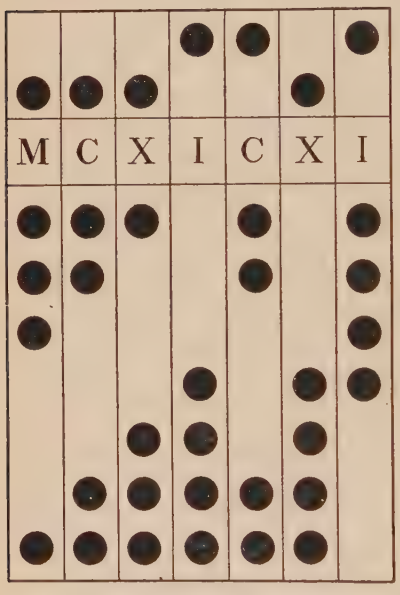


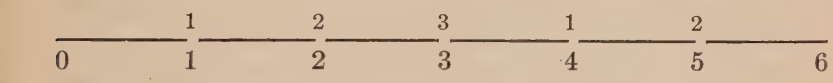
FIG. 32. A Roman counting-board. For counting, pebbles were used; but only those pebbles "count" which lie near the dividing line of letters. Each pebble above this line, when moved down close to it, has five times the value of one below. The board now shows 4 units, 5 tens, 2 hundreds, no thousands, etc., a total of 8,760,254. (From Cubberley's *The History of Education*,[1] p. 65.)

Which bonds first? — The counting bond is the most easy and interesting for the learner, occurs most frequently, and prepares the way for most other bonds to be. It was the practical interest in "how many" that led the race into arithmetic through counting; and looking at the matter from this practical standpoint, all our arithmetical processes — adding, subtracting, and so on — are just so many quicker and more simplified ways of counting up and down the number scale. A glance at the Roman counting-board (Figure 32) shows what

[1] In the Riverside Textbooks in Education, published by Houghton Mifflin Company, copyright, 1920. Used with the permission of the publishers.

a terrible task this reckoning by counting must have been before modern invention produced our faster and easier ways.

Counting leads to addition; for to add is simply to remember what you get when you count so many and then so many more, as three and then two more. Having demonstrated with objects, it might help to draw on the board a line (like that below) the divisions and large figures of which



represent the ordinary counting series, and to show that if we count three and then start in from there and count two more, we land at five — and the same with all other additions. Subtraction of course works in just the opposite way, and multiplication is a quick way of adding, and division a quick way of subtracting. In teaching, however, it is probably better to associate division closely with its opposite, multiplication.

Boundaries between topics. — It is probably best to regard arithmetic as one whole subject, an orderly system of bonds whose purpose is to count, to bunch the units into groups of tens, hundreds, etc., and then to handle them in such a way as to get results quickly and easily. We certainly should not try to teach all of counting or of addition before taking up anything else, but should at all times and at every point *form any bond next that seems to fit in next, and which promises to bring us out where we want to arrive.* To stay within the circle of 10 this year and of 100 next is like having a child travel all over a ten-mile circle this year, a hundred-mile circle next, etc. There may be greater difficulties within the ten-mile area, if we travel all over it, than would be found in taking an express train and crossing a continent.

For example, if a child thinks of a hundred as a unit, he can add four hundreds and two hundreds as easily as he can add four apples and two apples.

As stated before, denominate numbers should not be wholly segregated and then concentrated as one topic, but introduced, a bit at a time, wherever those bits will fit in and strengthen other bonds. Dollars and cents should come before decimals, serving as an introduction to that subject; and as the handling of decimals differs from that of integers in nothing save the placing of the decimal point (a matter made very easy by modern devices), and as the meaning of tenths is illustrated by dimes, and that of hundredths by cents, it would seem, theoretically at least, that the subject of decimals should precede that of common fractions. The simpler fractions, but not very extensive operations with them, will of course have been introduced, one after another, almost from the beginning.

How addition prepares for subtraction. — There is a beautiful definiteness about the teaching of the fundamental operations, for every much-used combination, and especially all combinations of one-figure numbers, can easily be inventoried, catalogued, and isolated for special drill. Although the number of these combinations is limited, the thoroughness with which each must be taught is almost without limit. Every one of them must be made to work with perfect accuracy — and this means that the bonds will work slowly at first; but later they should be brought to a fair degree of speed. If separate tables had to be taught for addition, subtraction, multiplication, and division, the labor would be enormous.

By teaching subtraction as the opposite of addition, and division as the opposite of multiplication, we can reduce

the number of necessary tables to two, the addition and the multiplication tables. The pupil then subtracts by adding, that is, by the so-called Austrian method, the method of "making change."

Change-makers commonly start with the price of the article purchased and add to it until they reach the amount laid down to pay the bill. For example, if we buy a 17-cent article and lay down 50 cents, the change-maker will probably say "17, 20, 25, 50," handing out, as he adds, 3 one-cent pieces, a nickel, and a quarter.

The child who has mastered, in addition, the problem $\begin{array}{r} 4 \\ +5 \end{array}$, learns to ask himself, when he meets in subtraction the problem $\begin{array}{r} 9 \\ -5 \end{array}$, "What must I add to 5 to get 9?" or "5 and *what* make 9?" At a later stage, after sufficient drill, of course the very sight of such a problem sets off the answer directly and spontaneously, with no self-questioning or further thought.

How multiplication prepares for division. — As the addition tables enable us to subtract, so the multiplication tables enable us to divide. The child who has learned that $7 \times 9 = 63$ will soon learn to ask himself, on seeing 7 as divisor and 63 as dividend, "7 times *what* = 63?" When 9×7 has been learned, the sight of 9 and 63 in this divisor-dividend relation will set off a similar question. Finally, 9 and 7 as factors and 63 as product becomes so intimately bound together as to bring the answer automatically in such exercises.

From the cases that "come out even" we proceed to division with a remainder. Thorndike would have us teach the uneven divisions of all numbers below 20 by 2, all below 30

by 3, all below 40 by 4, and so on. He suggests a table like the following:[1]

10 = —— 2's.
10 = —— 3's and —— rem.
10 = —— 4's and —— rem.
10 = —— 5's.
11 = —— 2's and —— rem.
11 = —— 3's and —— rem.
.
.
.
89 = —— 9's and —— rem.

Such bonds prepare the way for short division, and are useful for other reasons.

Order of teaching tables. — The "logical" way of mastering a table would seem to be to take it "just as it stands," keep it in graded order, and so avoid skipping any items of it. For instance, we can easily build up our addition tables from

$$\begin{array}{cccc} 0 & 1 & 2 & 3 \\ +0 & +0 & +0 & +0 \\ \hline 0 & 1 & 2 & 3 \end{array} \text{ etc., or } \begin{array}{cccc} 0 & 1 & 2 & 3 \\ +1 & +1 & +1 & +1 \\ \hline 1 & 2 & 3 & 4 \end{array} \text{ etc., to } \begin{array}{cccccc} 0 & 1 & 2 & 3 & 4 & 5 \\ +9 & +9 & +9 & +9 & +9 & +9 \\ \hline 9 & 10 & 11 & 12 & 13 & 14 \end{array} \text{ etc.}$$

Crossing out the combinations that are duplicated as table after table is added, we have left 55 different combinations of two digits each. But we should only befog a child by beginning with zero plus zero, or perhaps with zero plus one, as we mystify him when we begin, in multiplication, with "one times" a number; this probably does not seem to him to be *multiplying* at all.

When you have to learn the names of thirty pupils in your

[1] E. L. Thorndike — *The Psychology of Arithmetic*, p. 76.

grade, you would not like to commit them from your seating list until you could say them off, row after row, and not get acquainted with their owners until afterward. You take first the more striking personalities and the names easiest to remember. The tall boy is Tony, Flossie is the one who came to see you before school opened, Mary Golden has golden hair and smiles over her book, etc. Later, when you know them all individually and as a room-full, you can name off from memory row after row.

Items of an arithmetical table have also their personalities, some striking, interesting, and easy to master, others more prosy and flat and difficult. 2×5 is easy, for one carries it about on his two hands all the time. In fact, most combinations that include 5 or 10 are easy, and should be marked for early mastery. Also, nearly every table contains one or more items which have been mastered before in a different form. A pupil who has learned the multiplication table of 3's should welcome, in later tables, the sight of 4×3, 6×3, and so on. Finally, all items of the multiplication tables beyond 9×9 can be postponed until the little learner is more mature; and as we never have to use them in written multiplication, it would do no great harm if they were not taught in the elementary school at all.

Readiness. — Investigation brings out two peculiar facts about arithmetic: it is popular, generally, among children — as a rule is better liked than any other branches except the manual arts, drawing, certain forms of gymnastics, and history; yet more children fail in it than in any other branch. The solution of this apparent contradiction seems to be that the subject is in itself attractive to pupils, but that our time and method of presenting it are such as to make the children suffer where they love.

Very likely one of our fundamental faults is that of teaching it — much of it — at the wrong time, that is, too early. Children of grades four to six or seven, when asked what uses of numbers they make or notice outside of school, have spoken of football signals, spots on dominoes or dice, counting in games, adding up the store bill and making change, reading numbers on houses, automobiles, watches, pages, time-tables and ice cream checks, counting time in music and dancing, keeping a personal account book, and making out bills for work done. Most of their extra-school arithmetic is included under counting and the reading of numbers. At the same time, they delight in manipulating abstract numbers, and "mechanical drill is a pleasure." [1] The conviction seems to be growing that many of our "practical" problems are very impractical for children and that applied arithmetic, that is, arithmetic as applied to anything except what children are immediately interested in, may well be postponed to the junior high school period.

The second great destroyer of readiness is the too profound "explaining" which so many teachers still persist in, but which their pupils do not call for nor profit by, and which only obscures matters and bewilders the children, especially when they have to repeat it themselves. This, together with other formalisms, such as the copying of all problems to be solved, too great a quantity of written work, and the writing out of a concrete interpretation of many numbers all the way through the solution of problems, has made arithmetic and a good time very far apart.

Formerly, the achievement of children in foreign schools, especially those of Germany, was often compared with that

[1] See Noon's investigation as reported in the *Journal of Educational Psychology* for November, 1919.

of our own, to the apparent disgrace of the home product. But we should also compare the number of suicides among German school children with the number in the United States. There is a question as to how much pressure should be put on the rising generation if we want it to rise to its best.

We can, of course, make the same appeal to the stock instincts and old habits, in the teaching of arithmetic, that we can make in the teaching of other branches. Number games, in particular, are found to be very effective. Smith makes the statement that more people in the history of the world have learned the elements of number through dice than in the public school.[1] Perhaps it is unfortunate that we can not furnish each pupil a dice box and a set of speckled cubes without shocking the parents.

But the peculiar charm of arithmetic lies in its appeal to something not found in the lower animals, and which may almost be called man's intellectual instinct. Its ideas are as perfectly bounded as billiard balls, and move with the same precision and accuracy; it requires no workshop or gathering of field specimens, is "all in your head," yet gives marvelous control over the outer world; and its problems require the exercise of a perfect mechanics of thought. If we can take advantage of this appeal along with others, can make our pupils feel the fine sense of mastery that its drills develop, can secure variety by introducing new topics without loss of continuity, and — it may be added — if we can procure textbooks with the same quality of type and illustration that we have in reading books, perhaps with sprightly line drawings to provoke a little arithmetical humor occasionally,

[1] David Eugene Smith — *The Teaching of Arithmetic*, p. 88. For a variety of number games, see Chapter XIV of the same book.

the nerve fibers of most of our pupils will be a-tingle with readiness.

Exercises by the tandem method. — Guidance, we can see at once, must be largely internal. The old way of providing it was by putting the pupil through what we may almost call the advanced logic of arithmetic, which consisted of just such explanations as one expert mathematician might be expected to use in presenting his discovery to another. But it is not so much the connections for mathematical logic that we want to form; it is *bonds for number craft* — quite a different thing.

The nearest approach to the tandem method is by imitation, "showing." The old-time teacher was warned so often against doing the pupil's work for him that she came to think of "helping" as robbing him of his chance of originality, initiative, independence, and pioneering power. Then came the "discovery" method, by which the teacher was supposed to lead the child to find out everything for himself. But no one of us, in traveling, cares to "discover" the art gallery, the landscape, and everything else which common sense tells us thousands of people must have seen before. What we want is a good guide who will lead us directly to the most advantageous view, from which we can get a masterful idea of the whole.

We are teaching subtraction with borrowing, say, when the pupils already know subtraction without borrowing. We have begun by subtracting 2, 5, etc., from 10, setting the problems down on the board and showing that, since we cannot take the 2 or the 5 from 0, we must borrow the 1 to go with it. They know the result in advance, and can easily "see through" the process. Next, let us subtract 15 from 40. "See how I set the numbers down, just as we

always do. I cannot take 5 from 0, so I get a 1 to put with it, as I did before. Five and *what* make 10? *Five*, and I put it down. Now comes the only new thing you have to learn. Look: I add a 1 to the 1 below, and say '2 and *what* make 4.' *Two.* I put it down, and I have my answer. To prove it, add 25 to 15 and see if you do not get 40."

"Now watch me and help me while I do some more examples like this. Subtract 18 from 42. Tell me how to write the numbers, George." (Call at first on bright pupils only.) "What do we think first, Mary?" "Eight and what make twelve? Four" — and I write it. "Now, who can tell what to do next?" Etc.

After we have done a number of examples in this way,— "Who will come to the board and try to do one all alone?" Later, the whole class will try. "Tell me if you are puzzled. Don't do anything unless you are pretty sure it is right."

We hardly need to formulate a rule for this method. If we have one at all, it will be a very simple admonition, and in child language. The teacher may ask, time and again as the lessons go on, "What must we always be sure to do after we borrow 1 and subtract?" "Add one to the next number below." Later, "What do we do if there is no next number, or if it is 0?" Etc.

No explanation is necessary beyond showing the pupils that it works, and this they can find out by counting or adding. If they want the explanation in terms of tens and units, and ask for it, give it to them, showing that the same effect is produced whether we decrease the tens in the minuend or increase the tens in the subtrahend. But such talk as this, when they are not ready for it, would throw most of their little brains out of gear. What they want is bonds for *working* the example rather than for understanding the

process; and *as a rule it is easier to go from the working connections to the understanding bonds than from the understanding to the working.*

Drill and oral work. — The total amount of time given to drill has some influence, of course; but investigation shows that regularity and even distribution of time, day by day, is still more significant. Right concentration of effort has much to do with lowering the purchase price of success. As already stated (see Chapter IV), the most economical way to fix any bond is to give it a number of interested repetitions at first (perhaps ten or fifteen for the ordinary mathematical fact), then a constantly decreasing number, at constantly increasing intervals, until there's no such word as fail, so far as that connection is concerned — or at least until failure is very rare. Of course there are differences in difficulty, and we do not know yet just how great those differences are. But at critical points, as in teaching the addition and multiplication tables, we can place each item on a separate card, discard the easy as fast as they are mastered, and reserve the difficult for concentrated bombardment.

If somebody would only invent a way of drilling on the fundamental operations without loss of time and in such manner that the pupil would know at once whether his result was correct, it would be one of the greatest blessings arithmetic could receive. The nearest approach to it now is the printed practice exercise.[1]

Oral work was long considered so important that it was taught from a separate book and at a separate period. But we do not want pupils to form a separate system of brain

[1] *The Courtis Practice Tests*, which have been found effective, may be procured from the World Book Company, Yonkers, N. Y.

paths for it. For all common calculations, there should be tongue bonds as well as hand-and-pencil connections. Further, these tongue bonds ought not to involve long and complex "oral analysis," as in the old "Mental Arithmetics," but should be direct and simple, that the pupil may practice as he will perform. Imagine Smith going into a store and seeing a price tag, 65¢. "If one yard costs 65¢, $2\frac{1}{2}$ yards will cost $2\frac{1}{2}$ times 65¢. In 1 there are 2 halves, and in 2 there must be 2 times 2 halves, or 4 halves, etc." No; Smith doesn't say that. He probably thinks, "Two yards would cost me a dollar and thirty cents. Half a yard would add 33¢, and that would make a dollar sixty-three." The superintendent of schools has no right to assert that learning has lost its dignity if he finds pupils saying the same thing.

Oral work, being rapid, enables us to "guide the nerve current *repeatedly* along the right path." Our best teachers advocate giving a little time during each recitation — perhaps five minutes — to rapid, spirited oral work. Most of this time should be spent on work with abstract numbers; but here is also a golden chance to correlate arithmetic with what is going on in other branches, and to relate it to the environment. Local arithmetic is needed, as well as local geography, and the pupil should become familiar with it before he sallies forth to conquer the world numerically.

Preventing and correcting errors. — In the matter of correction, both pupils and teacher suffer from the blues of the blue pencil, and to little purpose; for correcting the paper does not correct the pupil's brain paths. In the study of Composition (Chapter XIII), we discover several ways in which the teacher of arithmetic can help both herself and her class: by having correct forms copied from book or board — a limited number of them, as in making figures, setting down problems

in addition, and so on; by giving dictation, as "Write all the numbers from 1 to 50," later uncovering the correct forms on the board and having pupils correct their own work under supervision; by help when work is being done; by special attention to common major errors during the class period; by having many short problems on the board and correcting them quickly as a part of the class work; by having pupils (under supervision) inspect each other's work; by furnishing at first hektographed or printed matter with blanks to be filled, and later the complete forms so that the pupil can do his own correcting; and by insisting that each pupil form the habit of correcting his own paper to the best of his knowledge before handing it in.

This last has given rise, in the modern teaching of arithmetic, to the process of checking. Addition is checked for correctness by adding again in reverse order; subtracting by adding remainder and subtrahend to get minuend; multiplication by reversing multiplicand and multiplier, and multiplying again; division by multiplying divisor and quotient to get dividend. These methods, together with other simple ones which various texts present, should be taught, and taught thoroughly. They enable the learner to know, and to know that he knows — a state of mind conducive to wisdom, peace, courage, and efficiency.

Practicing for future performance. — The subject matter of arithmetic is often considered under two heads: Processes, such as the fundamental operations, and Problems. Some schools stand high in one, some in the other. With the processes there ought to be little trouble where drill is thorough, for we perform these the same way in school and out. Here is a fixed and limited system of brain paths, and if we form them well they work well. Nor do problems

present such an infinite variety if they are common-sense problems stated in simple, common language. But the makers of problems too often feel that they must bring in something novel or sensational for pupils to figure on, and that their language must have all the formal dignity of a state paper. It has been found that a problem can be made nineteen times as difficult for children, by just a few changes in its phraseology — another reason for postponing difficult problem work till the children have some mastery of English.

What makes a good problem good? A good problem is one which conforms to our familiar laws of Readiness, Exercise, and Effect. Firstly, it should present some situation which the pupil cares about. Whether that situation is real or imaginary makes little difference; but it must be interesting to the child. Secondly, it should contain (in the early years, at least) but one point of mathematical difficulty, and no points of linguistic or other difficulty, and it should lead the pupil just as directly as possible to exercise himself on that one mathematical point. Finally, its solution should give the pupil something he wants — yield him a supply of satisfaction.

The way to teach a child to think, to analyze problems, is to practice the problem with him. Thinking is not so mysterious as we sometimes suppose it to be. It is just a matter of having one's brain rich in bonds, with discrimination switches to guide the nerve impulse here and there until it issues in the right response. Learning to think is much like learning the roads about the country and putting up guide posts to help us find the way next time. Teacher and pupil should together lay the discrimination switches, set up the guide posts. "If it takes two men three days to do a piece of work, how long will it take four men to do it?"

Here the old bond of "two times two" may be set off, giving the answer, "Six days." "But if Johnnie helped you with a piece of work, would it take you longer than if you worked alone?" We must form a new bond, "The more workers, the less time" — and a good brain under good conditions will have the discrimination switch properly set next time, and not make the same mistake again.

Effect. — Since arithmetic, well taught, is popular, and arithmetical mastery brings its own flush of pleasure, I shall only make brief mention here of certain matters which commonly interfere with this fine effect. Such are confusion from involved "explanations," or from going too fast. The prime arithmetical virtue is clearness and definiteness. To secure it, pupils should practically be allowed to take their own pace, so long as they have a pace.

Fussiness on the part of the teacher is another destroyer of pleasure. This may take the form of needle-point accuracy, whereas all we want is such accuracy as society commonly demands in any case. Neatness, virtue that it is, may be overdone: the pupil must be allowed his first rough draft preceding the final finished copy in this as in composition. Sometimes a form of "analysis," and especially written analysis, is followed to the point of tedium. Let the pupil "explain" very much as he would to a fellow pupil who needs help. Sometimes the fussy teacher tries too hard to eliminate, from the very beginning, those extra thoughts or movements which always characterize early learning. Let the pupil write down, for the time at least, the number he borrows or has to carry; or say, in adding, "Seven and five are twelve, and six are eighteen," instead of "Seven, twelve, eighteen." An energetic mind, fixed on its purpose, will drop these useless things as soon as they *are* useless.

A simplified course of study, an attractive book well printed and illustrated, a clear-headed teacher, and no work inflicted on the pupil unless it contributes to necessary bond building — these will bring something better than the pot of gold at the foot of the rainbow.

Testing essential bonds. — In no other branch, probably, is it so easy to isolate and define precisely what we aim to teach and, at the end, just what we think we have taught. For this reason, arithmetic was one of the first branches in which reliable tests were standardized. These tests are of two kinds, corresponding to the two divisions of subject matter. Accordingly, we have tests of fundamental operations, and of reasoning.[1] These differ in that some are designed to test speed and accuracy in performing a number of operations of about the same degree of difficulty, while others present a "ladder" of increasingly difficult steps up which the pupil climbs until he reaches his limit. The uses of these tests are in general the same in arithmetic as in other branches: to make our teaching more definite and help us to use the most work on the hardest points, to enable us to make comparisons of schools, methods, etc., and to give the pupil the stimulus of knowing and trying to beat his old record — no small inducer of readiness.[2]

[1] Attempts have also been made to formulate diagnostic tests, to find out in advance how much mathematical ability a pupil has. See, for example, the *Rogers Tests for Diagnosing Mathematical Ability*, Bureau of Publications, Columbia University.

[2] Two of the most widely used tests in arithmetic are the *Courtis Standard Research Tests* for the fundamental operations, to be obtained from S. A. Courtis, 82 Eliot Street, Detroit, Mich.; and the *Stone Reasoning Tests*, which can be procured from the Bureau of Publications, Columbia University. Various others have been produced, and doubtless more will be. As the field of tests and measurements is one of rapid change, it is well to watch its developments through the educational journals and the more recently published books in that special department.

CLASS EXERCISES

1. Working together, formulate a number of ideal problems in several topics. Compare with problems found in textbooks.

2. Let each examine a textbook, and report on it in class. Pay special heed to (1) subject matter, noting especially whether needless topics are included; (2) arrangement of matter, noting especially whether there is a good amount of practice, in effective sequence, on fundamental bonds; (3) language difficulties; (4) the nature of the problems; (5) general make-up of the book as to paper, type, illustrations, and power to make mathematics interesting for its own sake.

3. Each may present, as if teaching a class of a certain grade, some one point, as how to make some of the figures, how to carry in adding, how to do long division, how to handle dollars and cents, etc.

FOR FURTHER STUDY

1. Are you satisfied with the way arithmetic was taught to you in the elementary school? If so, what were the strong points of the teaching? If not, what are you going to do differently when you teach it to others?

2. So far as possible from memory, describe the kind of arithmetical problem you most enjoyed in your elementary school days. The kind you most disliked.

3. Run through the list of "Bonds to avoid" and state whatever reasons you think there may be for including them; for omitting them.

4. Give reasons why you think tables should or should not be learned, from the beginning, in serial order; why they should be learned backward or why not.

5. Take some problem and show, by example, that "to translate a problem from literary language into the language of the equation is the first and fundamental step in solving it."

6. Give reasons for and against teaching the multiplication tables beyond nine times nine. Of what value in practical life is the table of 11's?

7. Show the value of having pupils approximate the answer to a problem — "It would be about so much" — before working it out precisely. How would it help, for example, in first placing the decimal point, so as to be sure to avoid absurdly great or small answers?

8. Should textbooks contain answers to problems?

9. Review the method of teaching and learning a spelling lesson (in Chapter X) and see whether you find anything that can be applied to the teaching and learning of tables in arithmetic. What are the points of likeness and difference between learning a list of words and learning the items in a table when both are understood?

10. Devise a game number, or report on one with which you are familiar.

11. What is the special value of problems formulated by the teacher or brought in by the pupils?

12. Try to tell what you mean by explaining and proving. How would this do? — "To explain or prove a thing to anyone is to show him that it fits in with the bonds he has already formed." Give cases, as that of the white man explaining the steam engine to the Indian by telling him there was in it a kind of giant who had to be treated in a certain way, etc.

What does this have to do with the kind of explaining and demonstrating we do in arithmetic?

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CHAPTER XX

Geography

Exercises. — 1. How do you *practice* geography? (Note that we can answer such a question easily when it is asked of most of the common branches.) Make a list of daily-life situations in which the average person, child or adult, needs geography. It is not enough to say that one uses sugar at the breakfast table and this sugar comes from the South and from various islands. List only those situations where geography makes a difference, where a geographical response is necessary and the individual will suffer to some extent if he cannot give it.

2. You have been transplanted to some strange planet, perhaps Mars. Make a list of the chief things you want to know about that planet in order to live on it successfully. Granted that sources of information similar to those on earth are available, such as newspapers, libraries, means of travel, etc., how do you prefer to find out what you want to know?

What is geography? — Geography is the study, in the large, of what nature has done here, and of what man is doing as a result. It is the general story of how man makes a home for himself here on earth, and of how he lives in it when he gets it made.

When geography began, it was more literally "writing about the earth," as its name indicates. Only a small part of the earth had been found. Every new discovery was a mighty marvel, and started dreams of fabulous fortune. Now that we have found both ends of our little oblate spheroid and learned its limitations, and especially since we have come to realize, with great pain, that God has made of one blood all the nations of the earth, and that, being

such close neighbors as we all are, we might better study and understand each other and coöperate than fight it out, the human interest is highest.

If there were no people in any other part of the earth, we should care as little about its remote regions as we do about the geography of the moon. But put human characters into the plot anywhere, and immediately the play of interest is on full swing.

The result is that geography is coming to overlap other subjects considerably, as biology in the study of plant and animal life, and history in the treatment of human events. But our branches of study are like the rooms in General Charles Lee's house, separated by chalk mark partitions. It is rather a convenience to be able to step easily from one to another.

What good is geography? — When advocates of the subject undertake to convince us of its great practical use for all children, they usually have a stuttering time of it. The plain truth is that the average child in a good home has very little need for what is commonly taught as geography; and the average man, too, can grub along pretty well from day to day and still know as little geography as Christopher Columbus' critics did.

But do we want to grub along? It is in the higher and more intelligent type of life that geography gives its best service. There is direct self-preservation. As "weather comes from the west," so many of our worst diseases, cholera, smallpox, influenza, come from the East. When the newspaper tells us such a disease has reached the ports of Europe, it is time to take extra precautions. There is indirect self-preservation — making a living. The eastern farmer is foolish to pit his garden patch against the western

plains. Let him raise, rather, the perishable stuff for the great cities near by. Then there is the rearing of offspring. My neighbor's daughter was threatened with tuberculosis. He sent her to Colorado, where she studied and recuperated for a year, returning then to the East, where she has had no further trouble. In maintaining proper social and political relations, geography gives superior service. In a world that somebody sets fire to every once in a while, we must know who carries the matches and where he gets them.

But man does not live by bread alone, nor on the crust of the earth alone. His view of life and his attitude toward the world he lives in may be more important than what he eats, or even whether he eats at all for a time. Suppose you were a citizen of Columbus' day. The world might be for you a little flat thing, with falling off places all round, and outlandish animals to gobble you if you strayed far from home. Water boiled in the southerly seas. Men, if they lived on the underside of the world at all, had to hang head down, in constant danger of falling off into nowhere. A ship that ever slid down over the bulge could never sail "up hill" and get back again, and the Atlantic Ocean was known as the "Sea of Darkness."

Geography is a "liberal art," a liberating science. It is the life craft of the race. It is environment study which expands our environs from the dooryard to the starry heavens. It should be taught as such a subject.

Situation and response. — The situation is any disturbing or rousing condition, individual, national, or racial, which can best be mastered by forces of a terrestrial-human kind.[1]

[1] Here we might add, "and which is not dealt with in any other branch of study." As it is difficult to separate geography sharply from other branches, so it is to characterize exactly the geographical response. But the quest brings insight.

The response is finding and applying those terrestrial-human forces that will win success.

"Food will win the war." We respond by bringing more food out of the ground. The coal supply of the world will some day be exhausted. Very well. Then future generations will have to find something to take its place, or change their way of living.

What bonds to form. — If one is to make use of these terrestrial-human forces, he must know what they are, how to get at them, who controls them, and how. Now, the best key and most interesting approach to all this lies in what the people are doing. Man, like a plant, must have heat, light, air, water, and food. In addition, he must have activity of some kind, especially play and recreation. To satisfy these needs, he must work. The fundamental human geographical needs and necessities, then, are food, clothing, shelter (including fuel), work, and play. To answer these necessities, in whatever country or clime man finds himself, he uses, up to the limit of his intelligence, all the resources nature has placed there. Watch what he does the world over and you will see the terrestrial-human forces in action.

The essential bonds to be formed in connection with any country or region can be discovered by answering the following questions: [1]

1. What kind of people and about how many live there?
2. What are they doing?
3. Why are they doing it?
4. Why do they do it that way?

Answering these questions will lead to the answering of three or four others of importance. (1) What has Nature done

[1] Questions 2, 3, and 4 were suggested by an address (though not on a geographical subject), by Dr. Frank E. Spaulding.

there? What has she placed under the soil in the way of minerals, in the soil or the waters in the way of fertility, above the soil in the way of climate? (2) What is she doing there now? Rain or snow, calm or blow, volcanoes or vegetation? (3) Why does she do it? The Sahara is a desert, and Florida is too rainy to raise cotton. Why?

We start with people because human interest is the leading interest with us all, children especially. What we give as the answer to each question, from games to governments, will depend on how old our pupils are. Geography is an exhaustless subject, and cannot be systematized for young pupils. Give what is called for. We may take up further questions with older pupils: What should the people do, in such a land, that they are not doing? What of the future, the outcome of these terrestrial-human forces at work? How is it all going to affect us, our country, the world at large? A further question which we shall want to answer in connection with locations that are vitally interesting to us is, How can we get to that place, and from there to other places? This involves forming bonds for direction, distance, maps, latitude, longitude. Somewhere in the course, we want to see that our pupil gets a unified view of the world as a whole, as a great ball spinning through the heavens, of the general distribution of land and water, and of that which affords man his food, clothing, shelter, work, and play.

Less important bonds. — We have said little of names, nice definitions, exact locations, precise boundaries, capes, and the bends in the rivers. The old botany was bent on names; the new botany tries to understand plant life, and takes names as necessary incidentals. In the same way, the new geography (which is old enough now to be grown up) teaches a limited number of names and locative details as

necessary incidents, but fixes its eye firmly on *terrestrial-human* life.

What related responses are ready? — In general, not many related responses are ready. The pupil may be able to understand "what kind of people live there," for an American child is likely to see, on the streets or pictured in the movies, many kinds of people. He may himself be any one of many kinds. But until he has come into contact with many occupations, and in particular, until his experience has made him appreciate economic needs, he cannot go far in geography. I think we have been forcing it on him too early, and that the book study of it, in anything more than story form, should not begin before the fifth grade.

At the same time, he is not without resources. He may have cut out and drawn and constructed many things from many lands. He has read of the

> Little Indian, Sioux or Crow,
> Little frosty Eskimo,

and may have sung the songs of other lands. His nature study (and perhaps gardening) has been a direct introduction to the study of terrestrial-human activity. Some will have formed many geographical connections through travel. Others will scarcely have gotten ten blocks from home. Among other interests that may have started geographical brain-paths are the weather report and map, the ball games played in this city and that, travelers, the automobile map, mail, and the radiophone.

Relation of the desired bonds. — Most of the facts we teach in geography are either independent of each other, or can be taught independently. That is to say, there is

no intricate network of connections that must be formed as we go along. Gradually, however, as the pupil matures and the course progresses, the whole subject will be bound together by associations this way and that way into one organized whole. The better the book and the teaching, the more perfect will this process be. Cotton in the United States will be compared with cotton in India and in Egypt, and cotton everywhere will be related to soil and to climate — especially to frost and rainfall.

Trunk line bonds are formed by what is known as "type studies." A type study is a very careful study of anything — a mine, a mill, a forest, a region — in order to gain an understanding, through it, of all other things like it. If our class studies agriculture in one region, it then knows a great deal about agriculture in all other regions that are at all similarly situated.

From sensori-motor to high level bonds. — In construction work, drawing, nature study and all other branches that we have taken up so far, the pupil has, or may have, his object at hand to react on. The ideal way to study geography would be to travel over the earth, and visit every point studied, with an expert who knew just how to point out whatever is most interesting and important. But our pupil must respond to things at a distance, must pass from knowledge of things seen to the study of things not seen, and he must master these unseen things largely through the use of maps, pictures, and print.

How can this be done? By two processes: (1) Study home geography. (2) Express this home geography in symbols, that is, maps, pictures, print, etc., such as the pupil will have to interpret when he studies remote geography.

How to study home geography. — Study home geography by finding out what kind of people live here, what they are doing, why they are doing it, and why they do it that way. Follow up the interest of food, clothing, shelter, work, and play. Find out what nature has done here in the past, below the surface, in the surface, above the surface, what she is doing now, and (so far as little folks can follow) why she does it. Go straight after the things that make a difference, and *form as many sensori-motor bonds as possible.*

In doing this, we are forming connections that are easy and most interesting for the pupil, that will occur most frequently, and that will prepare the way for all that is to be taught later. For the geography of all the rest of the world must be understood in units of what is gathered here at home. A young woman, reared inland, went to Atlantic City on her wedding trip. "Why!" she exclaimed, on first viewing the ocean, "you can't see across, can you!" (It is like the sea of matrimony.) As we build up a graphic vocabulary for drawing and an agricultural vocabulary for farming, so we have to form in our pupil a geographical vocabulary in terms of which maps and pictures and other aids can tell him of the wide, wide world.

Here again the Boy Scout method is a good one: work up some *genetic* geography. Go out into the woods and learn how to find your way. Build a fire without matches. Make a bed of boughs. Find your own food. Earn a dollar and save it. You will learn to appreciate food, clothing, shelter, the elements of life craft, of which geography is the big expansion.

Expressing home geography in symbols. — Perhaps the best way to picture home geography is to make a few pages of a very elementary geography as if for some foreign group

of children — who can read English. Visit your farms and industries, railroads and other roads, land and water forms, buildings and council chambers, and take kodak pictures, make drawings, collect views, make notes. Include everything that you think your foreign cousins should know about the region. For your own future purposes, it is fine, of course, if you can find a sample of every kind of geographical subject which you want your pupils to interpret, by and by, from the ready-made geography which you are going to place in their hands. The descriptive part can be worked up in the language class (and the teacher may manage to get it into typewritten form). Crude the whole thing may be, but illuminated with photographs and cut-out views, post card pictures and maps, it will not be without its charms.

We must make maps of every kind that is later to be interpreted from the book. The outline map, with direction and scale indicated, will be taken up later (see the Class Exercise at the close of this chapter). To give the idea of relief and cross section, procure plastic material — sand, clay, paper boiled to a pulp, flour and salt, putty, plasticine — and model some very familiar contour such as the old coasting hill. Cut down through it, say along the line where the road runs over the top, take away one half, and study the side so exposed. Draw this cross-section view.

Readiness. — As one glances through the *Geographic News Bulletin*,[1] he is struck by the fact that almost every one of its many illustrations shows samples of mankind, or of the striking works of man, or of the animals in which man is interested. The keynote is *life*, human life — and that is the keynote of interest in geography.

[1] Prepared and printed weekly by the National Geographic Society. Teachers can procure it by addressing the Bureau of Education, Washington, D. C.

If we keep to the forefront kinds of people, what they are doing, why they do it, and why they do it that way, then it is hard for anyone to prevent himself from being interested. Geography becomes the study of man at home in his world. To take a course in it is to call on our neighbors, and to get many hints as to how we can keep house ourselves. The interest we feel is an expression of something deeper than any one instinct, or ability, or habit; it is the urge of the original *will to live*, from which all instincts have developed.

As we should expect, then, there is no source of readiness which we cannot tap. We can play the games of foreign people, sing their songs, build their huts, tents, and so on, of snow and other materials, imitate their dress, dramatize their doings. We can arouse curiosity: "How do you suppose they ever manage to — ?" Along with this goes surprise: Iceland is not a land of ice, but of fire. The Icelanders import ice. "Why are they doing it?" To keep their fish from spoiling. Then there is the exploring, migrating, traveler's instinct which man has felt ever since his nomadic ancestors moved north and south with sun and rain, to feed their flocks. A wholesome fear is aroused as we contemplate nature's mighty works, followed by the feeling that we must work in harmony with her. The works of other nations stir up emulation: "How does our country stand in — ?" But the social instinct and the world view should lead the pupil to feel, finally, that man is one, as the world is, and that the house should not be divided against itself.

Devices help. The moving picture and the radiophone bring us the sights and sounds of the far away, but are not always available. A post card projector can be bought for a few dollars, or even made at home,[1] and some of the

[1] For directions for making one, see the *Book of Knowledge*, Vol. I, p. 9.

school supply houses furnish cards from all over the world. Certain phonograph records are valuable. The stereoscope must not be forgotten, maps are an aid, and books of travel and other similar books are geography itself. Correspondence with other classes at a distance is now frequent and successful. Periodicals, with their pictures, are often a kind of geographical news letter. Short trips can often be made, and volunteer automobiles are making longer ones possible. Higher grade classes sometimes conduct a money campaign during the year and then at its close take a tour.

Exercise: the beginnings. — Nature study, elementary science, life craft, gardening, agriculture, geography — these are all one branch in the beginning, and through the first three or four grades. When we are ready to put a stronger geographical swing into the work, I should say a good way to start it would be to raise the question, "What do all our daddies do?" taking care, of course, to carry the feeling that all useful work is good, and to avoid embarrassing anybody. From this we can proceed to why they do it, that is, find out what the various industries are for. Later, perhaps, we can make trips to some of the work places and find why the workers "do it that way." Nor must we forget the activities of the mothers, nor of the children themselves. Of course all this, together with the study of the land and water forms, the watching of the course of the sun, keeping of temperature records, etc., will be done in a very simple way. We can next pass to the making of our geography for the far-away children, as already described.

From home geography to the outer world. — In making the passage from home to the outer world, we need not follow any road that lies on the surface of the earth, passing from town to county, county to state, and so on. A

better highway is that of the *children's interests*, from postage stamps to presidents. They may or may not care to follow up the industries as they leave their home region. Probably they are more likely to follow the call of the wild. But one thing we may be sure of: they always like a good story, and they are pretty sure to vote for any kind of geography that can be put into the form of a good story — good *for them*.

Luckily for the teacher with little time, the authors of textbooks are making use of this story interest. We are so often admonished not to follow the book "slavishly" that teachers come to feel the teaching must be old-fashioned and inferior if they do follow the book. There are two answers. One is that in many places there are still so many slavish things about teaching that the teacher has no time for original work. The other is that an author should not write a book that cannot be trailed pretty closely with plenary profit. What is a guide book for but to be followed?

Somewhere early in the course should come a view, not detailed, but in the large, of the earth as a whole, that is, as a globe, with light falling on half of it all the time, with cold belts and warm belts, and with large masses of land and water. With a little trouble, a crude globe can be made of rags and some kind of plastic material, and a few locations marked on it. I would have a large globe standing or hanging always in the schoolroom, and with its axis pointing in the general direction of the north star. If a small globe can be afforded for each child, so much the better. General relations, sizes, directions, and distances will be learned from the globe better than in any other way, and are worth much more than the small fry of facts.

Maps, areas, names, and locations. — We do not size up our neighbor's doings by drawing a precise map of his farm

and placing an indicator for each stone row. We like to know, in a rough way, whether his farm is as large as ours, whether he is likely to strike oil under it, whether it borders on water where there is good fishing, and so on. Is not that the attitude we should take toward our national neighbors? We want to know that which is *significant*, which makes a difference.

There is no good reason for drawing many maps, and some of those we do draw might just as well be traced from the book. Areas we shall learn only in a relative way for the most part, as by taking our own state or country for a standard and then measuring others by that unit. Here again a good globe beats all other maps, for all are correctly represented on its curving surface, and all are drawn to the same scale.

Most of the names and locations that one needs to know (probably all that we adults carry in mind) can be learned in connection with the study of current events. A child brought up in a good home, where newspaper and magazine lead directly to the atlas and the globe, both supplemented by intelligent conversation and such travel-reading as most of us naturally care to do, seems to fare very well so far as his education in locative geography is concerned. Why not follow this pleasant plan in school? The jigsaw map puzzle, too, with its "Please hand me Nevada," and "Where does Missouri go?" is a real helper. If we can arrange for a great deal of practical handling of geographical material, enough of the names will cling, and not much deliberate drill memorizing will be necessary.

The tandem method and the right brain paths. — The next best thing to traveling over the earth with a wise guide is to traverse it, in imagination, with a good teacher. By con-

versation, by setting problems and working out their solution with the class, and with the help of the many devices already mentioned, she will see that right brain paths are formed and wrong ones avoided. And which are the desired bonds? Not word bonds, for the child can "learn" his geography in Latin words, or even in English words, and not know it at all. It is *mental picture* bonds we want; whenever we study a region, we want our pupil to *see* what is going on there, and to be able to think in terms of these mental pictures until he can tell what action is appropriate. When he can do this, he knows his geography.

Regional geography. — History and geography are the two hemispheres of one whole subject. A great deal of history is the extension, backward in time, of geography; and a great deal of geography is just the hither end of history. Both are the study of man and the earth and their doings with each other.

But history is the study of human-terrestrial forces, with the emphasis on the *human*, and geography is the study of terrestrial-human forces with the final emphasis on the *terrestrial*. History begins with a naked world and gradually covers it with people and political boundaries. Geography begins with the people and political boundaries, but progresses toward *natural* boundaries and nature-made regions, the coal region, the cotton belt, the Mexican plateau. As the course in geography progresses, these regions should be emphasized more and more. Since our ultimate object is to understand and use forces and materials that are first of all terrestrial, let us learn to think in terms of these forces and materials as units, placed primarily just as nature placed them. For this purpose, we need the regional map and the region taken as a unit of study.

Practice and final performance. — How does the adult "perform" in geography? Something "sets him to thinking." He goes for his globe, maps, atlas and other reference books, quizzes his friends, writes here and there. By and by comes the solution.

Early problems in geography must be very simple and brief, the answers easily at hand. Later ones may require a longer campaign. The members of one class "went" to South America by the investigation route; one going as consul, another traveling for the National Geographic Society, a third as the representative of a rubber tire company, and so on. One boy, in his effort to get material, wrote to different firms and agencies some thirty-two letters.[1] He later presented this work, showing samples of raw rubber, etc., which he had collected, to other classes.

Perhaps we may hope that some day pupils will leave the geography class with a clear view of world resources, and of how they should be unified and directed for world welfare.

Effect. — "How far is the sun from the earth?" was asked of a man who was taking an examination to prove his fitness for a position. "I don't know," he replied, "but it isn't close enough to prevent my doing this job well if I get it." He got it. Here is one reason why the effect of geography teaching has not always been so agreeable as we could wish. We have catechized on too many details that have nothing to do with the terrestrial-human job. We must not study geography with a microscope.

We shall get our best effect by keeping the human interest in the foreground, by following the lead of the pupil's interests, especially in passing from home geography to the

[1] See "Methods and Results in a Progressive School," in *School and Society*, Vol. XV, No. 369 (Jan. 21, 1922).

outer world, by careful grading according to his time and ability, and by conversational methods — in brief, by teaching this human subject in a human way.

Tests. — Geography is a large subject — as big as the world. No one of us knows it all, nor ever will. Further, as we teach it to children, it cannot be a very systematic, closely reasoned, and intricately organized subject. Consequently, it is very difficult to pick out a limited number of bonds which will show, by their performance, the degree to which the whole subject is mastered. Both the individual teacher, for her local purposes, and the devisers of standardized tests, should keep to the things that are fundamental, connections which one *must* have made if he has formed any clear idea at all of the world as the dwelling place of man.

A beginning has been made in scale building, but it is perhaps a compliment to geography if the subject proves too big to be measured easily.[1]

[1] A very good discussion of "Measuring Results" in Geography is found in Chapter XXI of *The Teaching of Geography*, by Branom and Branom.

Tests may be obtained from the following sources:

Department of Educational Investigation and Measurement, Boston. The Boston Tests are found in Bulletin No. 5, School Document No. 14 (1915).

Buckingham Geography Test. State Department of Public Instruction, Madison, Wisconsin.

Hahn-Lackey Geography Scale. H. H. Hahn, Wayne State Normal School, Wayne, Nebraska.

Starch's Geography Tests. University of Wisconsin, Madison, Wisconsin.

T. E. Thompson, Standard Tests in Geography. Monrovia, California.

E. C. Witham, Standard Geography Tests. Southington, Connecticut.

CLASS EXERCISE

The purpose of the exercise is to practice the process of drawing the first map with children.

Materials needed are a compass, two large sheets of paper such as strips of wrapping paper two feet by three feet, yard stick, and pencil.

Someone may be appointed to conduct the exercise as if with a group of children. It is assumed that they know the points of the compass, and the simple arithmetic necessary.

1. Project: to draw a "kind of picture" called a *map*, of our schoolroom. (If the sides of the schoolroom run very nearly north and south, go to the south end of it, or otherwise vary the exercise so that when the map is hung up, the north end of the map will not be at the top.) Lay down a large sheet of paper on the floor, the "children" disposing themselves so that they can see. Make sides of paper run parallel with ("the same way as") sides of room. Measure the room.

Can we draw the room full size on our paper? Solution: let a half inch on the map stand for a foot in the room. Develop idea of scale.

Lay yardstick approximately parallel with sides of paper and have children draw lines and mark off the proper lengths. Put in a few marks for desks, etc. Why not put in windows?

2. Place the map on the wall as if for hanging. "It is agreed by all that the top of a map shall (nearly always) mean 'north.'" Is the north end of our schoolroom map toward the top? How can we get it so?

3. Solution (introduced by questions): find north by the compass. Lay down another sheet so that sides of paper run north and south. Lay yardstick parallel with sides of room and repeat map. Hang it. Does "up" mean "north" on it now?

Discussion.

FOR FURTHER STUDY

1. Make a list of things commonly studied in geography, which could as properly be taken up in some other branch.

2. Give original examples of terrestrial-human situations and the appropriate geographical responses.

3. Comment on the teaching of geography to you as a child How do you think it could have been improved?

4. Review, in Chapter XII, the three stages which Binet found a child passes through in learning to see pictures completely. (See "What responses can the child make already?") How can we make sure that he is getting the full meaning from his geographical pictures?

5. Give original examples of type studies.

6. Should geography, or any branches of it, be continued in the high school? Give reasons.

7. To what extent does the average adult draw maps? What does this suggest as to the amount of map drawing that should be done in school?

8. If a child knows little about a country or continent, why should he not be troubled with its "journey geography" (telling how to get from place to place)? What trips about home, or in his own country, is it reasonable to ask a pupil to plan?

9. Why solve geographical problems in school? Do you think the average adult solves very many? Should he?

10. Which do you prefer to know, the names of the capitals of all the states, or how the people live in those states? Why?

11. What seem to you to be some of the greatest geographical problems now faced by the race? Can the children be led to appreciate them?

12. Describe any geographical games which you have played, or know of, or can invent.

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CHAPTER XXI

History and Civics

Yet sometimes glimpses on my sight
Through present wrong, the eternal right;
And, step by step, since time began
I see the steady gain of man. — Whittier.

Exercises. — 1. An historical vault is soon to be sealed, not to be opened till a hundred years from now. You are to place in this vault such records as you think will best enable the people of a century hence to understand and appreciate the present times. You may include phonograph records, photographs, written letters, diaries, newspapers, books, or practically anything else you please. What will you put in? Why? Should both Republican and Democratic (and perhaps other) records of political events go in? Catholic, Protestant, Hebrew (and perhaps other) records of religious events? English, French, German (and other) accounts of international affairs?

If you were to open such a vault, sealed a hundred years ago, what would you wish to find in it to enable you to understand the life of that time?

If you were transported to another planet, what kind of history and how much would you want to study in order to enable you to do your duty as a citizen there? By what means (books, traditions, monuments, etc.) would you attempt to get at the history of the people of that planet most reliably?

2. Would you rather live in a log cabin settlement as in colonial days, but with good, trustworthy neighbors, or in modern material luxury, but in a community where you could not trust the good will of the people?

In your judgment, which does the world most need, more scientific research, inventions, etc., or more training of human nature to make a moral use of what we do have? Why?

Should history and civics be taught together? — The uniting of the names of two subjects in the title of this chapter is not meant to indicate that they should be taught as one. In my judgment they should be so taught in the lower grades, perhaps through the first six. However, expert practice varies on this point, and you will have to make up your own mind about it.

What the chapter title does indicate is that a common spirit runs through the two branches. Their great and mutual purpose has been well expressed in the phrase, "socializing the child." Geography, as we have found, is another branch that helps greatly in the socializing process, and some educators there are who think that geography and civics should be taught, if not together, at least in very close relation. Again, history and geography have at various times been listed together and taught almost as one subject. Sometimes these three, geography, history, and civics, are grouped together under the name of "social studies." One of the healthiest tendencies of the modern school is to make social studies of all branches; that is, to make them contribute to the socializing process just as much as possible.

We may think of civics as the action side of history, particularly of present-day history, with special reference to government as the prime means for securing coöperative action. What all of us teachers of these subjects want is to get the child to understand and appreciate the social situation in which he is placed, *and to do something about it.*

General nature of history-civics. — The study of civics no longer covers the mere anatomy of state and local government, with a record of the salaries of officers and their

length of term in service. As Barnard points out,[1] it is more like hygiene than anatomy. It is a study of social duty, emphasizes function rather than structure, and has a course of *activities* as well as one of studies.

History, as already stated, is similar to geography. As geography is the study of terrestrial-human forces, with emphasis on the *terrestrial*, so history is the study of human-terrestrial forces, with emphasis on the *human*. It, of course, takes us into the past; for history, as one writer puts it, is "everything that ever happened," "the past itself, whatever that may be."[2] Many of man's past doings can be explained by reference to his environment. Wide seas or towering mountains blocked him here, open rivers and pleasant valleys caused him to migrate there. Yet he has in some sense a will of his own, and cannot be wholly explained by what lies about him. A nation, like an individual, is the product of its inheritance and its environment. Many historians have not taken sufficiently into account the blood of the historical actors. For instance, here are the Persians and the Hebrews, both situated in territory often invaded. Why did the Persians become so warlike under this stimulus, while the Hebrews have always been so comparatively peaceful? Because of the difference in the breed.

Further, we must not leave our pupils with the idea that "history repeats itself" in the sense of aimlessly retracing an empty circle, like a cat chasing her tail. It does repeat itself; but the repetition is spiral and progressive, widening into larger circles and rising to higher levels. We want our

[1] See his excellent treatment in Chapter XXI of *Teaching Elementary School Subjects*, edited by Louis W. Rapeer.

[2] Henry Johnson, *Teaching of History*, p. 1.

pupils to appreciate this progress and deliberately to help it on.

Situation and response: mental attitude. — In the first place we aim, not at word bonds merely, but picture bonds. Even some feeble-minded children can recite pages and chapters of words just as they stand in the book. But we want our pupils, so far as possible, to see the picture of the past, or, more strongly still, to reconstruct and relive that past, and to feel it as a living thing.

The historian asks us to cultivate in the children what he calls "historical mindedness," and that means an interest in history and an appreciation of it. The man of historical mind has many facts at command, but not statements that he has swallowed, open mouthed, from every source. He asks of each history and historian, "What does this mean? Is it true? How do you know?" He tries to think out the application of these facts, especially to present problems: "Shall we have a League of Nations? What has nationalism done to us and for us? Internationalism?" Etc. But most important of all, perhaps, historical mindedness means that we will not take sides first and then try to drag the facts over after us, but will see on which side the facts are and then let our feelings follow them.

Historical appreciation — and that is a general name for the feelings left in our souls by the study of history — is one of the most valuable and dangerous products of all education. For instance, here is a fine quotation from a great American: "Americanism," he says, "is entirely an attitude of mind; it is the way we look at things that makes us Americans." Yes, but so was the old Germanism an attitude of mind; it was largely the way they looked at things that made them world-fighting Germans. After the World War

was over, a warning was issued to Prussian teachers and superintendents of schools against the misuse of history teaching for nationalistic ends. Instead of using history to incite peoples against each other, they were to present facts with broad historic setting; and all books tending to glorify wars as such were to be removed from the school libraries.

The dominant feeling that courses in history have most frequently tried to cultivate is patriotism; and that has meant loyalty to prince or king or emperor or form of government. This is far ahead of cultivating the selfish individualism that encourages each to rush into a cut-throat struggle for personal power and success. Still, we are going to see that no petty program of nationalism will suffice. As we have taught the subordination of self to nation, so we must teach the subordination of nation to society at large, and that means "all people that on earth do dwell." As in geography we want the pupil to get a view of the whole earth, so in history we want him to get a view of the whole past, and of all the peoples of the present. Socializing him means, finally, teaching him to subordinate his selfish propensities to the welfare of the whole, as our soldiers in the World War sacrificed their personal welfare and fought to make the world safe for democracy.

The essence of historical mindedness, then, consists in sincere devotion to the facts and sincere devotion to humanity.

Situation and response: action. — We want our pupils to practice history. How can they do it?

The situation can be presented in terms similar to those used in discussing geography. It is any disturbing or rousing condition, individual, local, social, national or racial, which can best be mastered by forces of a human-terrestrial kind.

The response is finding and applying those human-terrestrial forces that will win success.

Now, what are the big things that determine the welfare and happiness of a people — of the whole world-full of people — and concerning which we must learn to act, by voting and otherwise? First, there are the material things, such as environment, property, food, clothing, shelter, and mechanical contrivances like railroads. And secondly, there are what we may call the moral-social factors of civilization, such as home life, education, and the spread of the spirit of the brotherhood of man. We cannot sharply separate these two, but the distinction is one that our present-day world seems to stand in need of.

Let us arrange the principal topics under each head in the form of an outline which may be called

THE CHIEF FACTORS OF HUMAN WELFARE

1. Material
   - *a.* Place and people
   - *b.* Property
   - *c.* Progress through invention
2. Moral-Social
   - *a.* Health
   - *b.* Home
   - *c.* Higher life. Ideals
   - *d.* Vocation. Station. Recreation
   - *e.* Education
   - *f.* Politics. Citizenship
   - *g.* Progress through socialization

"Place and people" includes such matters as location and size of territory, climate, soil, the blood of the people by descent, their number, etc.

"Property," which has stood out so prominently in our law making, sometimes more carefully cared for than human life itself, suggests food, clothing, shelter, production and distribution of goods, with all the manufacturing, "business," and so on, that all these make necessary.

"Progress through invention" is largely mechanical progress by means of machinery — railroads, automobiles and other inventions. We should consider here also related types of labor.

"Health" must be mental as well as bodily.

"Home" includes the sex life of the people, their method of mating, whether eugenic or the opposite, the position of woman, the attitude toward children, and all other matters related.

"Higher life" brings in religion, philosophy, science, art, literature. Ideals are not a luxury; without them, individuals become as lower animals, and nations die.

"Vocation. Station. Recreation" is merely another name for opportunity for self-realization. Can each serve according to his nature and talents? Are there castes or classes, occupational or other? Are the people a playful and happy people?

"Education" raises the question as to how the people pass on their social inheritance to the next generation and whether they try to make it better than their own.

"Politics," using the word in the good old sense without a party stain on it, takes up questions of citizenship, law, crime and punishment, government, and the relation of nation to nation.

"Progress through socialization" includes everything that grows out of the spread of the spirit of kindness, of service to humanity for the common good, and of practical coöperation spreading from the neighborhood to a world-wide limit.

This last item is in some respects the most important of all, and yet it is one in which we can begin to train the children at the earliest school age. Whenever we can get a child to pick up a banana peel from the sidewalk, to use chalk for writing on the blackboard but not for scribbling in improper places, or to keep the rubbish in the rubbish can, we are scoring a triumph for history-civics.

Applying to the present what was vital in the past. — We can throw no light on the future that does not shine from the past. We keenly want to know what it was in the past that *made a difference*, that made the present what it is. If we can find this out, we shall have some hope of making the future what we want it to be. What bonds for the past shall we form in our pupils? What things shall be emphasized in the history course?

We can get at this best by asking of each nation or group that we study a few simple questions, somewhat as follows:

1. Who are you?
2. How are you?
3. How did you get that way?
4. How can you get more that way or less that way?

"Who are you?" refers to blood, descent, nationality, number of people, relation to other peoples, etc.

To answer the question, "How are you?" we should run through our outline of the material and the moral-social factors of human welfare, noting the distribution of property, health of the people, ideals, citizenship, education, and the rest.

"How did you get that way?" is a question which we might well apply to the Germany of 1914. How *did* she get that way? It is said that American civilization is producing slums and millionaires, and that the quarrels of capital and labor are a serious menace. If this is true, how did we get that way?

Naturally the question arises, How can we change things? How get more that way if conditions are good, less that way if they are bad? The good citizen wants light as to what makes a difference, so that he can make his mite of power count toward improvement.

Before we finish, we must apply these search questions to the world as a whole. What a motley, mongrel lot of people in it! What crazy behavior, self-conflicting and brutal! How did it get that way? Yet it has its good points. How shall it get more of some qualities and less of others? It is useless to say that the average citizen in a democracy has no influence on world affairs.

Has history been well written? — In many respects, history has been well written, but too few historians have written with the purpose and the courage to throw prominently before us the big things in the past that have made a difference, so as to enable us to make more differences and guide our fate.

Let us take a simple illustration from the facts of material civilization, the devising of the iron horseshoe about the fourth century of our era. Trivial as it may seem to nail a piece of iron to a horse's foot, this invention was probably as important, in its day, as that of the automobile in these latter days; for as Shaler tells us, it completely adapted the animal "to the conditions of our higher civilization by removing the one hindrance to its general use in the work of war and commerce."[1] Yet so important an event is likely to receive less notice from our writers of history than the doings of a despot.

What does our boy or girl — or we ourselves — associate with the decade 1840–50? The Mexican War. Yet in 1846 occurred something of much greater importance. It was the discovery of the anæsthetic properties of ether and their application to surgery. Before that day the patient had simply to be strapped to the operating table and submit to the cutting and the pain. The discovery of the value of

[1] Nathaniel S. Shaler — *Domesticated Animals*, p. 92.

ether saved vastly more lives than were lost in the Mexican War — just as Pasteur has saved more lives than Napoleon destroyed in all his wars. The average length of human life in the United States has increased from about fifteen years to about fifty years. "How did we get that way?" and "How can we get more that way?"

Whether or not our historians have wished to create ill feeling toward England, myriads of children have left our common schools embittered against that country. Yet little is made of the fact that she and we have lived at peace with each other for over a century, and that we have both gotten into the way of leaving our long common boundary line unfortified. How did we get that way? How can we get more that way — with all peoples?

The position of women and children, the use of alcohol, graft in government, the value and increase of education — how is the child prepared by his study of history to think and vote on such things as these? No matter what minor issues (such as that of a protective tariff) the politicians may try to point attention to, we want our young voter, when we have educated him in history-civics, to run over in his mind his own outline of material and moral influences and keep big things to the front. In particular, so long as material conditions afford a reasonable foundation for the higher life, we ought, in my judgment, to concentrate on the moral-social side of civilization and see that our statesmen and office-holders do likewise.

Less important bonds. — If the important things are those that have made a difference, then the unimportant are those which have not greatly affected either material or moral-social civilization. Probably we shall never all agree as to where to draw the line between the important and the

unimportant. Some seemingly insignificant matter may be the key to a great situation, or may be valuable for the grip it has on the pupil's interest. Martha Washington, at a ball given in her honor, wore homespun garments. What of it? She did it, so we are told, "as an example of economy to the women of the Revolution." And so the incident is not only interesting in itself, but throws a great deal of light on colonial war conditions.

In general, our dangers are too many dates, and too many details of government and war. It does not matter precisely when most things happened — only that they happened — nor just which battle won the war. We do want to know what the people were fighting for, and who won. In general, history does not tell us enough about the living conditions of the common people, whether they were starving or thriving, their health, home life, daily mode of living, education, and progress.

Another group of bonds which, though important indeed to the advanced student, must be ruled out of the elementary course, lies in the study of history as a *science*. Elementary history is like "elementary science": it has not the rigid organization of science, nor does it assume that the pupil is to be taught to investigate everything for himself, seeking original facts and drawing original conclusions as the expert does. We must not trouble him much with matters that lie on the borderland of doubt, nor with our "external" and "internal" evidences and criticisms. What we must do is to give him, from among those facts that are pretty thoroughly established, what is most interesting and important for him to know, so far as he is able, at his development, to assimilate it, and to try to build up in him a hardy kind of historic-civic common sense.

What related responses are ready? — In studying history-civics, our pupil must respond to three kinds of fact. They are—

1. The environment and its doings.
2. People and their behavior.
3. Human thoughts and feelings.

Even a young child can appreciate much of the environment and its doings, for there it is around him now; and the same is true of people and their behavior. He can follow us if we describe a storm, or Oliver Cromwell's walking up to the throne and laying his hand on it. According to the Stanford-Binet tests, a six-year-old should comprehend and react to such situations as "house on fire," etc., and a ten-year-old not only sees the absurdity in such descriptions as that of a road which "is down hill all the way to the city and down hill all the way back home," but can read an ordinary brief account of a city fire and report on his reading quite accurately.

Not until the child is twelve, however, is he expected to give even a conversational definition of such terms as "pity, "revenge," "charity," and "justice." In other words, if one would understand fully the mental side of adult history, from simple wonder about "the great spirit" to the writing of Newton's *Principia*, he must be an adult. What the younger child gets of it will be simple, feelingful and in high contrast, as when he reads that "the people loved the kind prince, but hated the cruel king."

Indications of a developing sense of time are found in the Binet tests for age nine, when the child is expected to give the present date at least approximately, and to name the months of the year. I am inclined to think that no one of us, child or adult, can *feel* remoteness in the past very

keenly; but *order of events* is the important matter, whether present or past. We want to know which came first, the preaching of Peter the Hermit or the Crusades, just as we want to know which comes first, the thunder or the lightning. Such temporal ordering of events as is necessary for the understanding of the history of any country is probably possible for most children by the time they are ten years of age.

As in so many other branches, we must censor our textbooks for language difficulty. It is not enough that the words be simple and familiar. Their inclusive units, the phrases, sentences, and paragraphs, must form the sketch lines of historical pictures that are concrete and vivid, simple enough to be understood, and interesting enough to attract.

Relation of the desired bonds. — There is danger that many of the desired bonds will be simple and single, representing isolated facts that each stand alone in the child's brain like the spelling of unrelated words. One reason for this lies in the teaching of so much detail that we have no time left to discuss, to associate, to relate facts to each other.

But time puts events in a series, and surely we should not do less for our pupil's learning. Further, we ought always to keep one eye on the present, that series of local, national, or universal events which make up the Now, and the other on that past series which we are studying, the events of Then, and never let a lesson go by without discovering what Now and Then have to do with each other. "Now-Then," or "Then-Now," should be our teaching slogan. In this way we shall not only help to "make the past real," but we shall make it even more "real," in the sense of more meaningful, than it was to those who lived through it; for we shall see it in relation to how it all came out. They were like

soldiers who die in the struggle, whereas we have lived to witness the defeat and the triumph.

In fact, I think this should be our great trunk line bond in teaching history for the purpose of the larger citizenship, this bond of Then-and-Now. It should stand out as the equation does as the organizing center of algebra, and the sentence as the organizing center of grammar.

Other trunk line bonds appear in our type studies. Massachusetts may be studied as the type of the New England Colony, Pennsylvania as the type of the Middle Colonies, etc., the rest being "the same only different." One battle may stand as a type for all the rest, and so we can shorten the war considerably — in our study of it.

Inclusive units of various kinds appear. A date, perhaps an inclusive date, such as 1825–1830, may be made the center of association for a whole cluster of important events, thus saving the strain on the learner's date memory. Topical recitations compel the pupil to group like facts. Administrations, ages and epochs, come in time to take on the group character, as when we speak of the age of Pericles, or the civilization of the Romans. We must be sure, however, that the pupil has facts enough to make these group phrases mean something before we require him to put meaning into them. One of the most common forms of inclusive unit is that of the outline. Used properly, it is of the highest value.

From sensori-motor to high level. — As we first study home geography and then pass from that to the geography of other places, so we should first study present home-civics and then pass from that to the history of other times and places. Indeed, geography takes one of the first steps for us, for through it we study "the environment and its doings," and

to some extent "the people and their behavior." The map making and descriptive work of our home geography are also a part of home history.

Our problem is the same as ever, to build up a "vocabulary," in this case an historical vocabulary of events actually experienced, so that in terms of that vocabulary (of experiences as well as words) our pupils will be able to understand the history of other days and places. And, again, as in geography, it is not necessary and often not best to pass by regularly enlarging concentric circles from the home center to the world, taking up in order the history-civics of the town, the county, the state, etc. Follow the lead of the pupils' interests, especially his story and action interests. During a world war, a pupil may be less interested in his ward than in the world, and may raise vegetables accordingly. There are just as important world situations in time of peace, but we often fail to recognize them as such.

How study home history-civics? — Our standard geography questions will give us a good beginning: "What are the people doing?" "Why are they doing it?" "Why do they do it that way?" The human action side of home history is likely to be most interesting, and we can get right into the midst of it by applying these questions to neighborhood doings: What does the policeman do? The fireman? The milk man? Or, in the country, the supervisor? The game warden? Why do we celebrate Thanksgiving? And so on. And we have never finished till we have answered the question, *What can we all do to help in this?*

Now, history is just a view backward over human life, taken in order that we may be able to deal better with the future. When the children are ready to take this back view of their community, we shall answer the questions, Who are

we? How are we? How did we get this way? We shall learn where our grandfathers or other ancestors came from, why they came here, how many there are of us, and the like. Next, "How are we?" Here we take an inventory of our "Factors of human welfare," material and moral-social. Are there property and money enough to go round? Are we progressive? Have we paved our streets, lighted them well, and so on? Are we healthy? Have we good schools, a public library, good town officers? Are we pulling together for the common good?

And how did we get this way, — whatever way it is? What natural resources, what industries, what public spirited men or what selfish rascals have brought us to what we are? Finally, when the children are mature enough for it, let us consider what we can do to get more this way or less this way. We need not be too dogmatic, but can allow plenty of room for freedom of opinion and of discussion.

Expressing home history in symbols. — When one of us reads a page of history, looks at historical maps and pictures, or goes through a museum, he must form, as best he can from these symbols — print, picture, map, relic, and sculpture — a picture of the past. As the child needs to express home geography before he can interpret foreign geography, so he needs to produce a little home history as a means to interpreting the history that others have produced. If all the members of a class write up some such event as a political rally, and perhaps collect related pictures of men, buildings, etc., they will understand very well why histories disagree or vary even to the pictures.

Introducing but one difficulty at a time in the history course. — Just what is the ideal grading for a course in history is a problem not yet solved. One plan very com-

monly adopted is to devote the first three grades to a study of home and community activities and problems, the observance and meaning of holidays, and the presentation of the problems of food, clothing, and shelter as illustrated in the life of primitive man, especially tree dwellers, cave men, Eskimos and Indians. Grades four and five are occupied with a sketchy history of the United States, from exploration and colonization down to the present. In grade six is given a sketchy history of Europe, with selected topics from the life stories of Greece, Rome, England and other countries, all designed largely to furnish a background for the further study of American history. In grades seven and eight, the history of the United States is gone over again, this time less as a story and with more attention to cause and effect.

With the coming of the junior high school, the most appropriate arrangement, as it seems to me, is the study of history-civics as one branch through the first six grades, followed in the next three by two branches, the first being history and the second consisting of other social studies, such as civics and the elements of economics. The essentials of United States history should be finished in grade seven, to be followed by more detailed study of it by those who go through high school. Grades eight and nine should present a sketch of world history both for those who are to leave school and those who continue, showing how man has struggled to make a happy home here on earth by conquering his environment and subduing himself. The young citizen ought to be left finally face to face with present problems and the question of what to do next.

Readiness. — It is not difficult to rouse interest in history. It is often the boy's best branch, and among children gen-

erally it stands by vote near the top of the list of favorites. We must take care not to chill this love by an unfit textbook — for the textbook is one of the strongest influences in the teaching of history — nor by making the subject too dry because of its separation, in ideas or language, from the pupil's experience.

Some of the methods and devices that have proved most effective as aids to readiness are story and biography, including accounts of local characters and events; the celebration of holidays; the use of diagrams and pictures, whether found in textbook or historical album or brought out by stereoscope or lantern; the viewing of models and relics, collected in a school museum or found elsewhere; historical excursions; the writing of letters, diaries, news, etc., as if of the time being studied; referring to source books, to old newspapers, original letters, diaries, and so on; dramatizing historical scenes, and learning and reciting famous speeches; side readings, not only of history proper, but of novels, essays and poems of historical spirit; and other problems and projects of a suitable nature.

Sometimes the civic side of the study receives a special stimulus through the requiring of certain practical achievements for the passing of the work, such as the use of correct language, good conduct at social gatherings, and coöperative participation in school organizations, or community work, or both.

Exercise: the beginnings. — Suppose we are in Honesdale, county seat of the extreme northeastern county of Pennsylvania. Our pupils have learned from geography what the people are doing and why they are doing it. We can make the transition into history by raising the question, Who are we? Have our people always lived here? If not, where did

they come from? The children discover that most of their families have lived here for years, but that a few have come more lately from "the old country" or elsewhere. Many came from a place called New England, and there are numerous stories of ancestors who fought in a big war called "the Revolution." We find that there is a strong "D. A. R." in town. What does this mean? How many of us are there in Honesdale? Etc.

Next, How are we? There is quite a bit of money here. There are comfortable homes, and we have several banks that hold between five and six million dollars for people who live in and near here. We have no street cars, but we have little need for them; and we have some of the prettiest parks and finest playgrounds that can be found anywhere. We are healthy. Bad diseases like influenza do not sweep through here as in some places; but there are things we can do to make us more healthy. What are they? We have very good schools, and we are making them better. The streets are clean. Who keeps them so? Can I help? People call this "the Maple City." Who planted all these maple trees? How long ago? What is it that kills some of them? How can we stop that? Should we plant more trees?

In due time comes the question, "How did we get this way?" And the first answer is, "Coal." But there is no coal under us. No, but this was once the best way from the Lackawanna coal fields to the New York markets. We go to see the old road bed of the gravity railroad, and the tall chimney of the stationary engine that drew its cars up the grade. Here where you see this big black bank was the largest coal storage ("the biggest pile of coal") in the world. Two million tons of coal went through here every year. At this point it was loaded onto canal boats. There are the

square-looking banks of the old canal, with paths still at the side for the mules that pulled the boats. Right here ran the first locomotive that ever was run in America, the Stourbridge Lion. And see, here is its picture in one of our newspapers. Some day, when you go to Washington, the capital of our country, you can see, in a big museum there

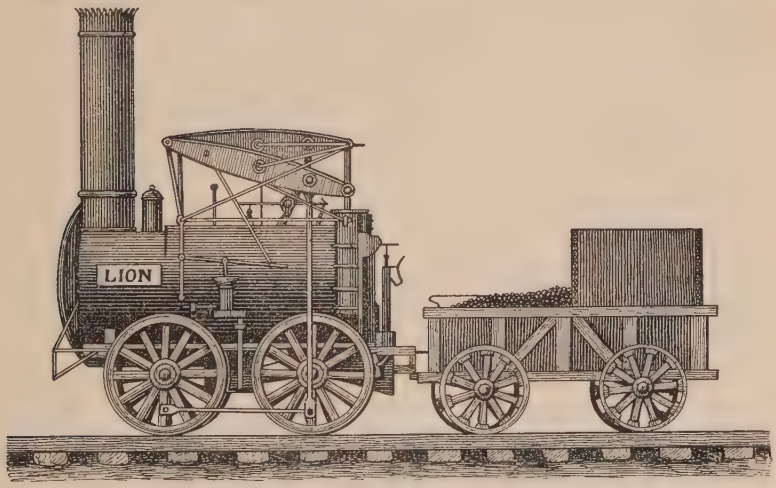

Fig. 33. The Stourbridge Lion, the first locomotive to turn a wheel in America. It first took the tracks at Honesdale, Pa., August 8, 1829.

(the Smithsonian), all that is left of the Stourbridge Lion.— It was largely the shipping of coal that made our town what it is.

Finally, when the pupils are old enough to think on the matter, we shall ask how we can go on growing and prospering, now that the coal goes by a different route. We must bring industries here, work to develop the county agriculturally, etc. — And all this is but a specimen fragment of what we shall hope to accomplish in our history-civics class.

Writing history for the future. — A hundred years or so ago, our town was very different. How we wish the school children or somebody else had kept a record of the way it grew, with pictures of persons and places. Here is a letter written when the Stourbridge Lion ran, telling how flags flew and people cheered when it started, and some careless boys set off a cannon and injured one of their number. Let us write the history of what happens here this year, for the people to read a hundred years from now. What shall we tell about? How shall we tell it? Shall we put in letters? Diaries? Pictures? Can we climb to the top of Irving Cliff and take a picture of the whole town? Do you know of anything that you think will be a relic or a valuable model in a hundred years? Let us put in the things that will tell people in other towns what is going on here. And when we get it all done, we will give it to the Wayne Historical Society. Perhaps they will keep it more than a hundred years.

Textbooks and teaching. — Having written some history, we are ready to interpret what is written by others. In the teaching of history in the United States, the textbook frequently determines the course of study, and usually has much to do with the method as well. No teacher should feel ashamed to "follow the book." Book courses in history, with appropriate recitation and discussion of facts, leave in the minds of pupils a very solid growth of historical fact and feeling. But the teacher should be ashamed if her pupils do not learn how to use the book. To see that they do learn how, she had better spend with them, especially at the beginning of the course, a number of study-recitation periods in which the art of getting the big facts from pages into brain cells is taught by the tandem method.

Following our chronological study, or perhaps along with

it, should go the study of outstanding topics. Here the facts are pulled out of their time order and grouped about such heads as Slavery, the Tariff, Party History, Inventions, Education. Some teachers make a list of outstanding topics and appoint, at the beginning of the course, a little specialist in each one, whose duty it is to collect and report, as the course proceeds, all important facts relating to his specialty. Of course these topics should be adapted to the children, and so chosen as to bring about an application of their learning to present life.

Teaching democracy by the tandem method. — All our study of history-civics should lead to enlightened action. How can we guide the nerve currents repeatedly along the right paths?

The teacher of the olden time, like the ruler of olden times, was an autocrat, and was expected to be. The difference was that the teacher's autocracy was expected to be a benevolent one. The modern teacher is more democratic. She does not throw away her power; but she regards herself as group leader rather than group boss, and tries to get her pupils to participate in making the school a good school. They discuss problems, serve on committees, plan programs, form clubs, run their own meetings, perhaps, or even engage in pupil government. The danger has sometimes been that when the pupils began to participate, the teacher felt it her duty to withdraw and let them go alone, lest she destroy their initiative. But the airman does not withdraw suddenly and leave his learner to manage the craft alone. Safety first! The teacher is there to prevent errors and exceptions, the exercise of wrong paths. Teacher (or teachers) and pupils should be citizens together, plan together, vote together, carry on together. Gradually, the teacher will try

to see to it that she becomes as useless as possible, bringing the pupils up point by point to their highest reach of democratic responsibility and efficiency in action.

Making practice like performance: attitude and morale.— Why has the world failed in so many cases to solve its problems? Because people (1) have indulged their impulses and narrow herd feelings instead of steadfastly maintaining the larger attitude of good will, and (2) have failed to see their problems afar off and find the right remedy while there was time.

To cure the first of these troubles, we must cultivate morale. Morale is unity of feeling that leads to unity of action. It is our feelings that determine what we do, and it is one of the teacher's largest tasks to educate these feelings. Democracy is just good feeling — backed up with intelligence, of course — applied to civic affairs.

It is a highly educative undertaking to try to enter into the feelings of the past; for we can see that many past passions have been very foolish, and that the wisest sentiment is a kind of large-minded attachment to the whole of things. We can bring our pupils most vividly into the moods of the past by referring to the present. "Why so much excitement about 'Andy' Jackson?" Because it was a case of "the common people" against the "upper classes." How shall we decide just who are "the common people" and who "the upper classes."

One of the best exercises a pupil (or any one of us) can set himself is that of maintaining, in committee work, in class or other elections, in the face of slurs and misunderstandings, perhaps, a serene and whole-hearted attachment to the larger cause, whether his opponent does so or not. The teacher should be a living exponent of the old motto,

In certis, unitas. In dubiis, libertas. In omnibus, caritas. "In things certain, unity. In things doubtful, liberty. In all things, charity, kindness." By her attitude and exhortations she can do much to determine the quality of future citizenship.

Gradually, we must try to enlarge the pupil's morale group, so that his unity of feeling is not bounded by his family, or school or town, or even his country, but by nothing less than all humanity. After all, good will is catching. In time we shall induce all men everywhere to adopt the motto, *In omnibus, caritas.*

Making practice like performance: problems and projects. — How do we perform? We face "current events," and from time to time we have to do something about them. Studying history ought to mean facing the current events of the past and trying to decide what you would do about them. We ask of primitive man our search questions, Who are you? and How are you? and find that he had no clothing, no tools, no fire. Children, what would you do in such a case? The Boy Scout is given a similar problem when he is required to "make fire" without matches.

Granted fire, but no matches, how would you keep it? How did our colonial ancestors keep theirs? Have you ever heard of "borrowing fire"? What does *curfew* mean?

What problems and projects can we find about our room, our school, our town? How can we take a hand in solving them or putting them through?

If there were slaves in our land and you wanted to free them, how might you do it? How did England do it? How did we finally do it?

Coming on up to the present: If the world is full of fight and we want to stop it, how can we?

Effect. — As the problem of readiness is a minor one in the teaching of history, so also is that of effect. To know our local, state, national and planetary past is in itself a pleasure to most minds, — so much so that history is often classed as literature. Further, by the method now happily becoming more common, of applying historical facts constantly to present problems, the pupil rightly feels that he is getting something which enables him to take part in the conversation, in the deliberation, and in the action of home, school, and community. An interested and historically minded teacher, a good textbook with suitable side readings, with lessons carefully assigned and clearly developed in an atmosphere of social class spirit, will leave the pupil ready for more.

Testing essential bonds. — In preparing our tests, let us make sure that what we require is "essential," something that made a difference, and that it has been brought out plainly in our daily work. Preferably, we shall choose those events that bear some striking and valuable relation to present life. In upper classes, this finding the bearing of past events on present life may be one of the very best points to test, — the difficulty being, of course, that there may be many cases in which no one can give a certain and standardized answer.

Attempts have been made to set up measuring scales for history teaching,[1] but the subject results in the forming of so many and so varied bonds, with such complex relationships involving a large fraction of the whole personality at once in the way of judgment, attitude, morale, and action,

[1] Standard tests in history can be obtained from the Bureau of Coöperative Research, University of Minnesota, Minneapolis, Minn., and from the Bureau of Publications, Teachers College, Columbia University, New York City.

that standardized measurement of the complete product is very difficult.

After all, the big test for our little graduate in history-civics is how he practices the subject, what morale he maintains, and what deeds he does as citizen of school, community, nation, world.

CLASS EXERCISE

As a student of education, you are no doubt interested in its history, and the application of historical facts to present educational problems.

Make a list of what the members of the class regard as the largest present-day problems of a school system, such as purpose of education, program of studies, methods of teaching, financing the schools, school administration.

How have these matters been met in the past? What light do past events throw on their solution now? Try to discover general trends; for example, toward or away from centralization of authority.

If desired, definite tasks may be assigned in advance. Also, the work may be limited to one phase of education, or one period. Parker's *History of the Modern Elementary School Curriculum*, Finney's *The American Public School*, and Cubberley's *Public Education in the United States* are suggested as texts on which to base such assignments.

Follow this with a discussion of the probable value of some such plan in the teaching of history generally.

FOR FURTHER STUDY

1. What use do you think should be made of current events in the teaching of history? What is the best means by which pupils can get the current news?

2. Show how history can be correlated with the other branches.

3. Do you approve of the way you were taught history in the elementary school? Why or why not?

4. Did you learn, in connection with your high school or other advanced history, to read the newspapers? What importance would you attach to this question as a test of the success of a history course?

5. "I said, 'How is old Ireland and how does she stand?'" In the old song, which of our search questions is thus presented? What other questions should be asked in order to find out completely the condition of the country and what to do about that condition?

6. What, in your judgment, is the value of historical tables showing, in parallel columns, what was going on in the same period in different countries or in various lines of development? Why?

7. What do you think are the largest problems the world now has to solve? Run through "The Chief Factors of Human Welfare" and see if this helps you to discover these problems.

8. How is the world more likely to secure "progress through socialization," by working on adult minds, or on the younger generation as it comes up? What importance do you attach to schools as a means to such progress?

9. Mention some of the things, such as a visit to a museum or historic ground, which have helped to make the past more real. What things have made the present most real?

10. Discuss the place and value of maps in the teaching of history.

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CHAPTER XXII

Literature

I have always thought that the chief object of education was to awaken the spirit, and that inasmuch as a literature whenever it has touched its great and higher notes was an expression of the spirit of mankind, the best induction into education was to feel the pulses of humanity which had beaten from age to age through the universities of men who had penetrated to the secrets of the human spirit. — Woodrow Wilson.

Well, as to education, the newspapers are correct; I never went to school more than six months in my life. But as you say, this must be a product of culture in some form. . . . I can say this, that among my earliest recollections I remember how, when a mere child, I used to get irritated when anybody talked to me in a way I could not understand. I don't think I ever got angry at anything else in my life. . . . I can remember going to my little bedroom, after hearing the neighbors talk of an evening with my father, and spending no small part of the night walking up and down, trying to make out what was the exact meaning of some of their — to me — dark sayings. I could not sleep . . . until I had caught it . . . until I put it in language plain enough, as I thought, for any boy I knew to comprehend. . . . I am never easy now, when I am handling a thought, till I have bounded it North, and bounded it South, and bounded it East, and bounded it West. — Abraham Lincoln.

Exercise. — You are going to study, in class, with a teacher, some piece of literature. What is likely to be the purpose of yourself and of most other members of the class in taking up such a study? How would you like to have the teacher, or class and teacher, proceed in choosing the piece to be studied? Describe briefly the method which you think would enable all to get most out of it. How many or what words should be looked up in the dictionary? What allusions chased down? How many figures of speech catalogued and explained? What historical and environmental details should be brought out? When, if at all, would you care to study the life of the author? — What relation have all these things to the purpose in view?

What light does this throw on the teaching of literature to children?

What is literature? — Literature is that kind of writing which appeals chiefly to the feelings, and especially those feelings which are universal, common to all. Because of this universal appeal, it chooses a subject of wide interest, such as the adventurer far from home; or the lover separated from his sweetheart; and because it seeks to rouse feeling, it presents this general theme in the form of a concrete, vivid, individual picture, such as that of Robinson Crusoe, or the lover in "The Raven." As further means to rousing feeling, it uses words that are polished and smooth-flowing, and often striking, either in themselves or in their phrasing; it builds on the bonds of deep and fundamental experiences in the reader; and it makes much use of imagination, frequently causing to shine out before us ideals which challenge to achievement.

Take Longfellow's "Excelsior" as a sample. Here is, in a fashion, the whole human adventure, the adventure of following an ideal. It appeals to all mankind. It puts this adventure in the form of a concrete, vivid, individual picture, that of the heroic mountain climber who resists temptation and pushes forward. Its language is polished, smooth-flowing, striking: Longfellow does not say, "It was getting dark rapidly," but "The shades of night were falling fast." It builds on fundamental experiences — the lights of home, the endearments of love. Much use is made of imagination, finding its climax in the almost supernatural voice that came "like a falling star." As for ideals, the poem is idealism itself, the ideal of having ideals.

Not every piece of literature embodies all these points; but every piece that is worthy of the name exemplifies some of them, and makes them prominent.

"We must have more bread an' less whiskey in this

house," said Molly to Pat. "Bread is the shtaff o' loife, ye know." "Yis," said Pat, "bread is the shtaff o' loife, but whiskey is loife itself!" We cannot approve of Pat's sentiment about whiskey, but his statement is very nearly true of literature: other branches are the staff of life, but literature is life itself. It is life projected into words. It is not only the verbal re-living of life, but the re-creating of life. For we have not only realists who paint life as it is — and get no further — but we have writers who take the mundane elements of our daily existence and recombine them so as to picture that better world we should like to live in, and which we can live in if we will all do our bit to produce it.

Situation and response: attitude. — In general, the situation is *living;* and the response is *living better*. Literature transforms us by the renewing of our minds.

Let us make this more definite. We have seen that literature aims to rouse feeling. Well, then, it is the duty of literature to shape the feelings, to help educate the whole emotional and affective nature. We want our pupil to honor his father and his mother, to love his country and all humanity as fast as he can grow up to it, and to feel an aversion to sneaking, bullying, cruelty, lying, and unfair play of all sorts. The school has not done enough for the feelings. It has worked largely on the assumption that if you give a child ideas he will put the power into them and carry them out; whereas a much better assumption is, that if you arouse desires, ideals, purposes, in the heart of a child, he will himself find or make the outfit of ideas necessary to carry out and realize them.

But feelings do not stand alone in the mind. We feel *about* something, a death, an election, and so on, and that something takes the form of an idea. Literature, then, must

have its framework of ideas, though its final aim is fixed on feeling. Now, that big framework of ideas one has of the universe and his relations to it constitutes his "philosophy of life." Is the universe a dead machine or a live personality? Is man an unlucky accident, perhaps a bubble on the stream of time, or the climax of ages of planning, a living soul of infinite possibilities? Is moral civilization to be preferred to material? And does it pay to live morally? Our philosophy of life makes a world of difference with the way we live, happily or unhappily, by the straight road or the crooked. This philosophy of life is built up in us bit by bit as a deposit of daily living, and largely as a result of the literature we read.

Situation and response: action. — Literature, like all other learning, should start from life and come back to life. It must be practical and idealistic, both. If, from reading it, we get dreamer's disease, complicated with paralysis of the will, our last state may be worse than our first. If the heroism of the "penny dreadful" does not make the boy a bit more heroic, then it is dreadful; and if the tears we shed over our pathetic heroine do not make us more sympathetic, then our heroine has only led us into a flirtation that leaves us less likely than before to love our neighbor as ourselves. But in general the result does show in action. We all feel how dangerous it is to children's conduct to expose them to unethical literature; by similar reasoning, it would seem that there must be at least a little likelihood of their catching goodness by being exposed to it. Traits often lie dormant till stirred by some stimulus from without, and literature may furnish that stimulus. A child may imitate more strongly the character in the book than he does any character he knows outside of it.

Literature may be read for pleasure, truly, and much of it should be. To teach our youth to spend their leisure with good books, even for pure pleasure, is to win a great triumph over the impure pleasures that might otherwise fill the void. But to cut the connection between literature and life by continual reading for pleasure only is to ruin, at length, both the literature and the life. The teacher of literature has, in general, the same responsibility as the teacher of history-civics, and that is to teach his pupils how to answer *with deeds* the question, What does this mean in terms of our present-day life, and how can we put it into practice?

Stimuli and reactions. — When an author writes a piece of literature, he proceeds from experience to words: he must (1) conceive a purpose, get ideas, get them into order (to form his outline or plot), and (2) get words, and get them into order (in phrases, sentences, etc.). But the learner who reads this literature must form word-to-experience bonds: he must (1) "get" the words, understand them in idiomatic order, grouped as they are to form phrases, figures of speech, etc., (2) get the ideas one by one as they are pictured forth, and get them in order, so that they compose, in the end, a unified picture, or interpretation, with a resulting feeling for the piece as a whole. The pupil who said " 'The shades of night were falling fast' means the people were pulling down their window curtains in a hurry," did not get from that group of words the picture which Longfellow intended he should; and the teacher who explained that the meaning of the piece as a whole is, "Don't bite off more than you can chew," failed in the end of getting the one deep meaning of the whole thing.

The stimulus, then, is a piece of literature, and it is well if the children can help choose it. The response is working

out its meaning, with dictionary and all other available helps, until the learner has gotten the *feeling* which the author had when he conceived the piece and which he meant to rouse in his reader. Since the voice (with appropriate facial expression) is the great carrier of feeling, the best immediate schoolroom response is that of good oral reading.

But we want our pupils to seek literature and pursue it long after school days are over, and so we shall try to secure other responses also, such as committing to memory at least a few of the most appealing lines; reading at home as well as at school, perhaps forming the fifteen-minutes-a-day habit; increasing vocabulary and giving conversation a wholesome literary trend; buying good books, and if necessary sacrificing a little for them; seeking literature in newspaper, periodical, and books; and learning to discriminate between the good and the bad in letters.

Bonds not to build. — Whatever contributes to the feeling that is the aim of our study, and which author and teacher are partners in producing, has a place in our program; whatever conflicts with it should be eyed with suspicion and probably omitted. We need not trouble ourselves about the multitudinous bonds involved in knowing the history of literature, or the lives of authors, or even many of their works, until our pupils show some sign of wanting these things. It is not our object to make them sophisticated so that they can refer in learned way to this author or that, or pursue their friends with that sometimes trying question, "Have you read so-and-so?" Our ideal is rather that of a little book well filled, a little literature well tilled, a little citizen well willed.

Then there is what may almost be called the original sin in the teaching of literature, cutting up its dead body and

wiring its skeleton and losing its soul. Outlines may help, but we must get the substance, the sentiment. Parsing and syntax may have some place, but they must keep their place. Hairbreadth discriminations may be necessary sometimes, but they must not spoil the hairbreadth escape. Figures of speech must not loom up so as to obscure the figure of the hero. We may sometimes have to build a complex enginery of ideas, but we must not forget to put in the explosive fluid and apply the spark. It is so easy to be intellectual merely, when we ought to be spiritual and feelingful, and should be leading our children into the highest sentiments they are capable of.

What responses are ready? — Reviewing a bit, we find that a child, in learning literature, must respond by feeling; must form concrete, vivid mental pictures; master beautiful, striking language; have "fundamental experiences" on tap; use imagination; and form ideals. We can sum this all up in two comprehensive questions: How much has he had of language? How much has he had of living?

The question of language mastery is a very acute one in the early grades — for the reading period should be occupied mainly with literature, and not merely with reading matter, from the day the child enters school until he leaves it. Fortunately, our makers of child literature are growing more careful in this respect. The stories are clothed in words of limited number, words selected from the list of those in most common use, and carefully graded as to difficulty. Ear bonds and mouth bonds for all or nearly all of the words used are likely to be found ready made. In the early grades, the child's vocabulary should broaden his reading; in the later ones, his reading should broaden his vocabulary.

"How much has he had of living?" The situation here is much like the one we found in history. To interpret either history or literature completely, one must have had experience with (1) the material environment and its doings, (2) people and lower animals and their behavior, and (3) thoughts and feelings in all their complexity. If the first two are kept reasonably simple and expressed in simple language, they trouble but little. It is the third that throws up the difficulties. For example, children cannot appreciate adult love stories; and most of them, I believe, cannot understand why there should ever be such a thing as a tragedy in print. The thoughts and feelings they like best to find in their stories are those elemental ones that flow from their dominant instincts, and so from such activities as eating, playing, going to parties; exploring and adventuring, as about a farm; playing pranks, triumphing by might or by right. It is no wonder that the animal story, in the first and second grades, is the favorite story of all.

Relation of the desired bonds. — We can see at a glance that literature, as we pass from the simple to the complex, requires bonds in every kind of relation, and especially inclusive units of infinite variety. To put a long sentence before a child and ask him to tell what it means is very like placing before him the numerous pieces of some machine and requiring him to assemble them and make the thing run. You can appreciate this the better if you will recall your efforts to translate some difficult piece of Latin or other foreign language. You realized very keenly that every word has its bond. If any word bond was lacking, you were embarrassed to that extent — you did not know what to do with that part of the machine. But the stronger word bonds began to assert themselves, sometimes too strongly, so that

your story went wrong and made no sense with what had come previously. You tried again, gave some of them more prominence than before and others less, and finally fitted all the pieces together harmoniously.

Children have to "translate" their English in much the same way. Professor Thorndike gave the following to some fifth and sixth grade children, who were directed to read it and then write the answers to some questions, re-reading it as often as they needed to:

> Nearly fifteen thousand of the city's workers joined in the parade on September seventh, and passed before two hundred thousand cheering spectators. There were workers of both sexes in the parade, though the men far outnumbered the women.

The first question to be answered was, "What is said about the number of persons who marched in the parade?" Some of the answers were: "two hundred people"; "eighteen thousand"; "200,000"; "maybe No. 12"; "a very great deal"; "the men were more than the women"; "the men were far ahead of the women"; "they marched nice"; "there was a lot of floats"; "the people are killed by the war"; "the meddles"; "Irish." [1]

Thorndike elsewhere states that —

> Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in the right relations, and also with the right amount of weight or influence or force for each. The mind is assailed as it were by every word in the paragraph. It must select, repress, soften, emphasize, correlate and organize, all under the influence of the right mental set or purpose or demand. [2]

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[1] See "The Psychology of Thinking in the Case of Reading," by E. L. Thorndike, in the *Psychological Review*, Vol. 24, No. 6, pp. 220-234.

[2] *Journal of Educational Psychology*, June, 1917. Article on "Reading as Reasoning."

If children have so much difficulty in forming, from simple language, a concrete picture of what actually happened, they will stumble still more when they come to the constructs of imagination, the building of ideals, and the ever loftier flight of the feelings.

One of the most important lessons we can learn in the teaching of literature is to recover from that great blunder of the past, from the days of the *New England Primer* right on down — the giving to children of selections for reading which we think superficially must be good for them because we have ourselves found them edifying. We are even a little worse than those officious friends who insist on lending us their book and compelling us to read it because they "enjoyed it so much."

From sensori-motor to high level bonds. — The course in this subject begins when baby *lives* his literature at home, when father is a horse or a bear and the little one a rider or a hunter. A much higher grade has been reached when he sits or lies with bright eyes fixed far away and brain busy forming pictures fast while mother sings or tells some tale of wonder. After a time, he takes his third degree. He begins to fabricate, to babble original childish stories, and so takes his place among the ranks of authors!

This cycle of experience should be repeated when school days begin. Keep life, especially at first, well ahead of literature. Shakespeare lived deeply, or he could not have written so well. He got a wealth of experience in Stratford and in the coffee houses of London, listened to many a tale from tongue and book, acted and saw much acting, and so produced his wonderful plays. Our pupils may go on a nature study trip or perhaps a number of them. We may then read or tell them the stories of some of John Bur-

roughs' nature study excursions. Can we not then write up a trip of our own, truthful as to the facts of nature but fanciful as to plot or incident? Even if we do not succeed so very well, the effort will make us appreciate such poems as "Robin Redbreast," "The Brook," "The Death of the Flowers," and "To a Waterfowl." Just as the writing of a chapter in home geography or present-day history for others to read helps us to interpret the geography of many miles away and the history of many years ago, so the preparation of a piece of personal, home literature helps us to appreciate the literary product of other minds.

In every case, the first question is, Have my pupils had enough experience with life to understand and care about this selection? If not, do not try to teach it to them. If they have, the next question is, Just what experiences have they had that will enable me to put this literature into terms of their living?

Which bonds first? — When we have learned how to grade life and conduct, we shall know just how to grade literature.

One difficulty is that if we analyze for the essentials, we find them all present from the first. For instance, the essentials of a good story (roughly speaking) are purpose, plot, character, and climax; yet all these are found, in some form, in the simplest story for the tiniest tots. The difference between the adult story and the juvenile is that these essentials become more complex in the more mature literature. In particular, more traits of character are brought out and these more finely shaded, and experiences are expressed — especially changes in character under the influence of fortune, friends, and foes — which lie beyond the children's understanding.

Yet we can do something in the way of discovering a principle of grading. The great trunk line bond in all our best literature is *personal experience*. There must be such a character, or such experience, that the reader can in some measure identify himself with him, or it, or both. Here is the reason for so much personification of animals, of flowers and vegetables, and even of inanimate things, such as the dish that ran away with the spoon. In the beginning, of course, the character and the experience must be very simple. Each personality may have but one outstanding trait, as the greedy pig, or the cheerful robin; but a story without a personality of any kind in it would be just no story at all.

These *personal experience* bonds, then, are the ones that can be made easiest and most interesting for the learner, that are bound to occur most frequently, and that are sure to prepare the way for the greatest number of bonds to be formed later.

Various efforts have been made to assign to the different grades the general type of literature, or even the specific selections, which seem most suitable;[1] but while these are good for suggestive purposes, Minerva must wish that each teacher had the time and the literary means to choose what is good for her grade. If she can tell what traits are appearing in her pupils, as home love, love of adventure, of mystery, etc., and can *find literature that expresses those traits*, she will be a good guide.

Readiness. — As we review our sources of readiness, it is easy to conclude that, other things being equal, that pupil will have most longing for literature who is brought up

[1] See, for instance, "A Course in Literature for the Elementary School," being Chapter XVIII of *Literature in the Elementary School*, by Porter Lander MacClintock.

among books and book talk, who brings a fresh and healthy mind to the work, whose teacher is enthusiastic about literature and full of faith as to what can be accomplished through it, whose reading is skillfully chosen and not overdone, who finds the reading period a happy one because of the way the work is conducted, and who is inspired by the vision of the fruit he is going to find among the leaves. Chiefly to be accented are the right literature and the right teacher — and the right teacher is one who loves literature.

Among the destroyers of readiness [1] we find what may be called "cheap reading," such as the comic supplement of certain newspapers, some of the juvenile series, and poor reading texts in school; the common prejudice among parents and others against imaginative literature and in favor of books of information and morality lectures; the limited ownership of books; and "the passing of the practice of reading aloud about the fireside."

To what extent the moving picture and the radiophone are supplanting the book, and to what extent they can serve as substitutes for it, we are unable to say. They ought to be able allies.

Exercise. — As to exercise, there are two fundamentals. The first is that the teacher shall have had a good course in literature, or failing that, shall study thoroughly for himself whatever he has to teach. The second is that, in teaching it, he shall do as he would be done by. If there is any place where we should forsake all rules of pedagogy and just do what a sensible person would naturally do with a group of children in the chimney corner at home, that place is in the literature class.

[1] See Orton Lowe's list of interfering forces in the first chapter of his *Literature for Children.*

How should we like to be "done by" if we were going to take up with our teacher of French literature such a piece as "La Dernière Classe"? We should expect some feeling to be the result, and we should want our teacher to keep that feeling topmost in his mind all the way through, to bring out for us and with us whatever contributed to that feeling and to repress or neglect all else. Should we take up the meaning of words and phrases, bring out the historical setting, dwell on the life of the author? If they are necessary to the desired effect, yes; but otherwise, no. The teacher might tell us that Daudet is one of the greatest story writers of all time, and that "The Last Class" relates a pathetic incident that happened at the close of the Franco-Prussian War. A question or two will tell him whether or not we have well in mind the historical situation.

Once over, twice over, or how many times over? There can be no set rule for such things. It depends on the piece and on the class. And who shall begin? Perhaps the teacher had better read it all through for us first — he can throw such expression into his French. If there are difficult parts, he will adroitly put them in his own words for the present; but the easy passages he may assign to us to read. We get the general effect, and we feel our hearts wrung — but we want them wrung again, and more poignantly!

We go over it again, dwelling on the incidents as one does on the lines of some appreciated picture. Study may be assigned, and we use our dictionaries with a will. The teacher takes pains to *rouse many associations,* to make us feel the piece in terms of our own experience. "Should we notice the cockchafers if they flew into our room? And yet not even 'the little fellows' looked up when the May beetles came humming in, so intent were they on getting their last

writing lesson in French before the Germans took over the school." What was it that choked the old teacher when he tried to speak? "Suppose you were giving the last lesson you could ever give in English before the foe took over your school, suppressed your language, ruled your country!"

This last, the forming of associations and the interpretation of the piece in terms of the pupil's experience, is *one of the most precious things the teacher can do, and one of the most commonly neglected.* It is here that she follows the bee, which, as John Burroughs says, furnishes a model for us to imitate in that it adds a bit of its own self to the sweets it gathers. The mixture it makes is the honey.

One more warning. Too much study of plot, movement, character, and climax is as barren and bad as too much defining of words, analyzing of sentences, and anatomizing of figures of speech. We are not studying to make our pupils great authors. We want them to learn how to live, and to learn it by sporting about in the English language. We can not tell ourselves too often that we are aiming to stir up a mass of connections that will rouse a feeling, and leave them the better for having felt it. To go nosing about too much among the stage fixtures would spoil the effect of the play.

The use of the dictionary.— The pupil may begin, any time after he has learned his letters, by making a little dictionary of his own. Placing the twenty-six letters at the tops of twenty-six pages of a blank book, he can enter words at first according to their initial letters, later placing them according to their second and third and other letters. Having practiced putting words into such an embryonic dictionary as this, he will easily learn how to find them in the larger book.

By the time he reaches the fourth grade, he should have a

simple *vade mecum* dictionary of his own, to be consulted especially in connection with spelling, composition, and literature. This ought to be regarded as a friendly book which does not persist, as most books do, in unfolding its whole story from start to finish like a gossip, but will tell you, discretely and definitely, like a good friend, anything it knows if you only ask it aright.

Special drill will be needed on diacritical marks and derivations, and on the quick finding of words. The pupil should be able to get from his wordbook, on demand, correct spelling and pronunciation, root meaning and definition. And happy is he who has learned to reënforce his reading with dictionary at elbow.

Memorizing. — It is a very common and a very desirable practice — that of hanging beautiful literary pictures on the walls of memory. We should make it as easy and agreeable as possible for all.

Memorizing consists largely in forming series bonds. To make it easy, put the matter in sensori-motor form, that is, "see the picture," act it, hear the sounds, etc., and see to it that the pictures are in a series, so that they can be recalled as such. Let me illustrate with a case given by Frances Gulick Jewett.[1] She found a boy trying to memorize the following lines:

> On came the whirlwind — like the last
> But fiercest sweep of tempest blast;
> On came the whirlwind, — steel gleams broke
> Like lightning through the rolling smoke;
> The war was waked anew.
> Three hundred cannon mouths roared loud,
> And from their throats, with flash and cloud,
> Their showers of iron threw.

[1] See *Control of Body and Mind*, Chapter XXIV. Ginn and Company.

He was saying each line or two from ten to twenty times over, gradually adding one such unit after another, speaking rapidly, learning slowly, and complaining of his wretched memory, particularly of the fact that he stuck at the end of the fifth line.

She told him to go very slowly, fixing his attention on word after word and phrase after phrase, making a vivid picture of everything, seeing the whirlwind, hearing the tempest, and so on. In addition, he was to "make bridges" (form connections): "waked anew" suggested how he would wake if "three hundred cannon mouths roared loud" right by his bed; "mouths" made him think of "throats," "cloud" led to "showers," etc. "Make sensible bridges when you can, but even a foolish bridge is better than a chasm." The boy caught the idea, called it "a great scheme," and no longer complained of his memory.

Summary of "Exercise." — To guide the nerve current repeatedly along the right path is to see that our pupils repeatedly get good and edifying feelings from literature. In order to approach the tandem method, let us yoke up with our pupils and study and enjoy one good piece after another with them just as we would do for ourselves, only making allowance for their immaturity. Let us not put in many outlines and character studies and pulverized facts, unless we would really want them for our own satisfaction if we were studying alone.

Preventing the exercise of wrong paths means, in the large view, preventing pupils from getting bad and destructive feelings from what they read. Our largest service here consists in guiding them away from bad reading into good reading — reading that is good for them at their stage of development.

How have the pupil practice as he will perform? Well, how do people "perform" on literature? School can never be like life until there is more joy in the recitation, teacher and pupil and book together. Why not?

Effect. — One kind of effect is too pronounced among people who undertake to be "literary." It is that downhearted effect which follows the acknowledgment that one has not read a certain best seller, or is not sure as to who wrote this or that, or why Poe was dismissed from West Point. But to try to read everything is like trying to eat at all the hotels in the country. So far as best sellers are concerned, the Bible and Shakespeare have been two of the best sellers for a long time back. And there is no more reason for knowing all the details of literature than there is for knowing all the details of history or of science. We must not trouble our pupils with such worries.

Our great crimes in this connection are choosing the wrong literature and studying it in the wrong way. For general study we must select that only which is of general appeal, leaving each to follow his individual tastes outside of class. The right and the wrong way of study have already been indicated.

Testing essential bonds. — The best passing mark a pupil of mine ever achieved in literature was made by a very sensible eighth grade girl who, on finishing the class reading of "Evangeline," burst into tears. The tears were the mark. I regarded them as conclusive evidence that she believed in "affection that hopes, and endures, and is patient," and "in the beauty and strength of woman's devotion." Of course we could hardly insist on such a test for every pupil, but we can expect expressive and intelligent oral reading of assigned parts. Let me

quote from Corson's wonderful little book, *The Voice and Spiritual Education.*[1]

> This brings me to say that, in literary examinations, whatever other means be employed, a sufficiently qualified teacher could arrive at a nicer and more certain estimate of what a student has appropriated, both intellectually and spiritually, of a literary product, or any portion of a literary prouct, by requiring him to read it, than he could arrive at through any amount of catechizing. . . . To adapt the French saying, *le style, c'est l'homme* ["The style is the man"], it may be said that *la lecture a haute voix c'est l'homme* ["Reading aloud is the man"]. Reading reveals the reader's spiritual appreciation or the absence of it. And it is only to the extent that a reader assures his hearers that he has himself experienced the sentiments to which he gives utterance, that he impresses them.

Would that we could conduct our courses in literature without an examination in the usual sense of the word. If we must resort to a list of questions, let us try to see that they test whether the pupil has appreciated the spirit, not merely the letter, of what he has read.

CLASS EXERCISE

1. Make an outline of what may be regarded as standard procedure in the teaching of a piece of literature. (For help, see Chubb's *The Teaching of English*, Ch. VII; Klapper's *Teaching Children to Read*, Ch. X; Goldwasser's *Method and Methods in the Teaching of English*, Chs. VII–IX; and MacClintock's *Literature in the Elementary School*, Chs. XIV, XV.)

2. Let each show how he would study a bit of literature with a class. Include an illustration of how to memorize a passage.

3. Try to make a list of the principal feelings, passing from simplest (characteristic of young children) to most complex (characteristic of adults).

Hint: The feelings, especially those of childhood, are the outflow of the instincts. Review the instincts listed in Chapter III.

[1] Hiram Corson. The quotation is from page 55.

Better still, study Robert S. Woodworth's "Inventory of Human Instincts and Primary Emotions," being Chapter VIII of his *Psychology: A Study of Mental Life.*

What basis do these instinct-feelings afford for the rough grading of literature?

FOR FURTHER STUDY

1. Give examples of writings that are not literature, according to the standard set up in this chapter. Is plane geometry literature? A weather report? A textbook in geography?

2. Could all textbooks be so written as to make them literature, or at least literary? Should they be? What hint is there here for the writers of textbooks?

3. It is sometimes asserted that literature aims primarily to give pleasure. (Was the Bible written for that purpose? Is it literature?) How do the statements of this chapter differ from that view?

4. Examine literature as to its value when gauged by Spencer's five tests: direct self-preservation, indirect self-preservation, rearing and discipline of offspring, maintaining proper social and political relations, and the miscellaneous activities of leisure.

5. Recall the literary study of your school days? What did you enjoy and profit by most? Least? What shall you imitate and what reject when you teach literature?

6. Can teachers be wholesomely "literary" even when teaching other subjects? Just what would this mean as to feeling, language, and imagination?

7. How should the transition be made from the "reading" of the early grades to the "literature" of the later ones? What differences in the method of teaching? (A special report may be made on this, perhaps based on Klapper's *Teaching Children to Read*, Ch. IX.)

8. Should moving pictures be included under the term *literature?* Lectures and phonographic productions (other than musi-

cal)? Radiophone messages of a literary nature? Can we expect as much book reading as in days before these inventions? Discuss.

9. Suggest means by which you would hope to get children to read outside of school, and to direct or influence that reading.

What effect will your own general reading and the sympathy between you and the children be likely to have?

10. How many books do you own? Are you planning to own any more? Where can cheap editions be obtained? How can children who have money be induced to buy books? Why should they if there is a public library at hand?

11. A shoe dealer tells me that some parents buy for their children shoes that are too small because they want to think their children have small feet. What kind of books are they likely to buy for their children's heads?

12. Darwin says that one of the most important factors in whatever measure of success he achieved was "unbounded patience in long reflecting over any subject." Show the place of discussion in the literature class, and especially why the teacher should adopt the tandem method of forming many associations between the literature on one hand, and the pupils' experience and the life of the present time on the other.

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